ENCODER PRODUCTS COMPANY

Bore Encoders

Spring 2007

Product Reference

ACCU CODER
by Encoder Products Company

CTi Automation - Phone: 800.894.0412 - Fax: 208.368.0415 - Web: www.ctiautomation.net - Email: info@ctiautomation.net

Bore Encoders

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Encoder Solutions For Every Application

Don't forget to check out the rest of our product families. Encoder Products Company manufactures a complete line of encoder solutions.

Shaft Encoders - A comprehensive selection of solid shaft encoders, in the most popular industry standard sizes for every encoder need.

Specialty Encoders - From stainless steel encoders for extreme environments, absolute positioning encoders, to unique linear measurement solutions, we have the specialty solution you need.

About Encoder Products

Company History

Encoder Products Company Inc. (EPC) is a leading designer and world-wide manufacturer of motion sensing devices. Founded in 1969 by William Watt, EPC began operations with a small line of custom encoders. Today, more than 35 years later, EPC's popular Accu-Coder™ brand is the most complete line of incremental and absolute shaft encoders in the industry. Our core philosophy is that each and every customer deserves quality products, superior customer service, and expert support.

Business Partnerships

Fostering long term business partnerships with satisfied customers is what we do best, and the heart of our mission. We take pride in providing superior customer service and supplying you an encoder that functions precisely, dependably, and flawlessly. Listening to our customers needs, and designing products that provide solutions for them, is a key to our success. It isn't every company that can say they have satisfied their customers for over 35 years!

Innovative Design Team

At EPC, we concentrate on encoders, making us famous for paving the path of the encoder industry and providing encoder standards for our industry since 1969. First to design the cube style encoder, now an industry standard. First to resolve mounting installation problems by providing an industry first flexible-mounting system. First to include Opto-ASIC technology, which virtually eliminates miscounts by eliminating electrical noise, and enhancing signal quality. First to provide an encoder that operates at 120° C. First to provide 6000 CPR in a 1.5" diameter encoder. First to provide a 3 year standard warranty, demonstrating that we stand proudly behind the reliability of each of our products.

Solving Problems

For over 35 years, we have been solving encoder problems. Custom designs, faster delivery, and reliable products are all areas in which we excel. We believe that an encoder supplier should solve problems, not cause them.

Custom Encoders Our Specialty

Through years of experience, we understand each industrial environment is different; you need an encoder that fits your specific situation. This ultimately means not having to make due with someone else's specifications or configurations, but having your own custom designed unit. Many of our customers have come to depend on us for this special area of customization. Using state of the art technology, we can design and deliver custom encoders faster than most suppliers standard products - often shipping your unique encoder in 2 to 6 days or sooner.

ISO 9001 Quality Systems

At EPC, quality is designed into every product. Before it's offered for sale, each Accu-Coder™ model is developed using state-of-the-art design tools and fully tested against EPC's exacting quality standards. But quality does not stop at design. During the manufacturing process, each Accu-Coder™ is subjected to a series of stringent quality control tests to ensure you are receiving the best encoder available. Our quality system has successfully been audited to the requirements of ISO 9001:2000, an internationally recognized standard for comprehensive Quality Systems. By paying close attention to detail, our Accu-Coder™ brand has become known throughout the industry for quality and reliability.

Mounting/Mechanical Installation and Applications

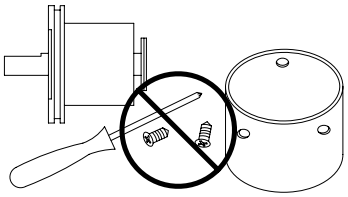
For over 35 years, our engineers have been designing encoders that are quick and easy to install. With a variety of mounting options available, your encoder should be a perfect match for your existing equipment. Accessories such as pivoting mounting brackets, measuring wheels, flexible couplings, etc., are available from EPC to ease installation. The first principle for every encoder installation is "Don't force it!". Striking or using excessive force can either damage your new encoder, or introduce excessive shaft loading, shaft misalignment, or other conditions shortening its expected life. Tighten all couplings and bolts to their recommended torque. Remember, tighter isn't always better!

Bore Style Encoders

- Make sure driving shaft is free from burrs and other defects.
- With flex mount flush against surface, tighten clamp or set screws first, then bolt flex mount to surface.
- Check for best possible alignment with hollow shaft and driving shaft to reduce wobble.
- Runout of the driving shaft, or misalignment between the driving shaft and the encoder's hollow bore, decreases the accuracy and bearing life of the encoder and adds vibration to the system. Re-installing the encoder on the driving shaft may improve alignment.

C-Face Style Encoders

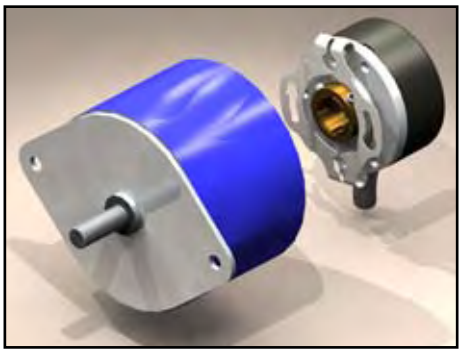
- Verify that mounting holes are in exact alignment with holes or studs on the motor frame.
- Tighten all fasteners with equal torque so as not to distort the shape of the ring.

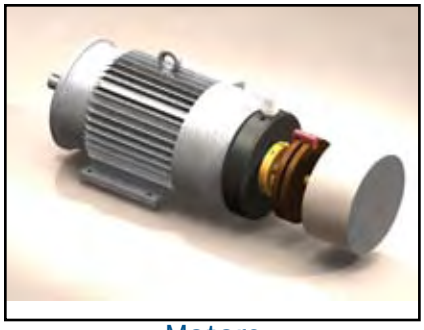


Do not disassemble.

Accu-Coder™ Applications Include:

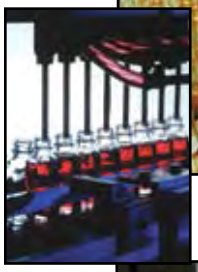
Any application that measures speed, distance, or position can use an encoder. An example of how an encoder works in a motion control system is diagramed in this typical cut-to-length example below.





Motors

Thru-Bore Encoders have become the popular choice for motor mount installations. Whether you are using a small servo or stepper motor, to a large heavy duty industrial motor, EPC has an encoder for your motor mount application.



Packaging

Food Processing and Agriculture

Metal Rollforming

Printing and Binding

Tools and CNC Machines

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Model 15T Thru-Bore
Model 15H Hollow Bore

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Features

- Very High Performance Economical Encoder
- Low Profile 1.0" (25.4 mm) Height and 1.5" (38 mm) Diameter
- Thru-Bore (sizes up to 0.375" or 10 mm)
- Simple, Innovative Flex Mounting System (Global Mounting Standards)
- Up To 12 Pole Commutation Optional (for brushless motor control)

The Model 15T or 15H offers a high performance feedback solution in a low profile package. Unlike modular or kit encoders, the Model 15 utilizes an integral bearing set, and an innovative flexible mounting system which is much more tolerant to axial misalignment or radial shaft run-out. The slotted flex mounts provide 20 or 30 degrees of rotational adjustment for commutation or index pulse timing. Installation is quick and easy! For brushless servo motor applications, three 120° electrical phase tracks can provide up to 12 pole commutation feedback. The optional 100° C and 120° C temperature options allow servo motors to operate at higher power outputs and duty cycles. The Model 15 provides stable and reliable operation and is an excellent replacement for other manufacturers modular encoders where a high performance solution is desired.

Common Applications

Servo Motor Control, Robotics, Specialty Assembly Machines, Digital Plotters, High Power Motors

Model 15T/H Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.

Mechanical | Electrical | Optional Features (Leave Blank For Standard Options)

15T	-	01	SF	-	0500	N	12	A	OC	-	F00	-				
		BORE SIZE[1]	MOUNTING		CYCLES PER REVOLUTION	COMMUTATION[2]	INPUT VOLTAGE	NUMBER OF CHANNELS	OUTPUT TYPE		CONNECTOR TYPE		MAXIMUM FREQUENCY		-20° to +85°C Std	IP50 Std	None Std
		15 3/16", 0.1875"	SF 1.812" (46 mm) Slotted Flex-Mount		See *CPR Options* below	N No Commutation	5 5 VDC	A Channel A	OC Open Collector[9]		F00 18" Cable[4] (Std)		Standard		OPERATING TEMPERATURE	SEALING	CERTIFICATION
		01 1/4", 0.250"	SA 1.812" (46 mm) Two Hole Flex Mount			A 4 Pole	12 12 VDC	Q Quadrature A & B	PP Push-Pull		F01 12" Cable		F3 Extended		-20° to +85° C (Std)	IP50 (Std)	None (Std)
		03 5/16", 0.3125"	SB 1.142" (29 mm) Slotted Flex Mount[7]			B 6 Pole	V1 5 to 28 VDC	R Quadrature A & B with Index Z[3]	HV Line Driver		F02 24" Cable		See Specifications		T1 -40° to +85° C	S1 IP64 for Thru-Bore & Blind Hollow Bore	CE CE Marked[6]
		02 3/8", 0.375"	SC 1.2795" (32.5 mm) Slotted Flex Mount[7]			C 8 Pole			PU Pull-Up Resistor[9]		F03 36" Cable				T2 -20° to +100° C		
		06 5 mm	SD 1.575" (40 mm) Slotted Flex Mount[7]			D 12 Pole			OD Open Collector with Differential Outputs[9]		M00 2M Cable[5]				T3 -20° to +120° C[10]		
		04 6 mm							Available on special request. Additional lead times may apply:		J00 18" Cable with 5-pin M12[8]						
		14 8 mm							LO Line Driver on ABZ, Open Collector on UVW[9]		K00 18" Cable with 8-pin M12[8]						
		05 10 mm															
MODEL 15T Thru-Bore 15H Hollow Bore																	

For enhanced connectivity, available with an M12 in-line connector

For specification assistance call Customer Service at 1-800-894-0412

Model 15T/H CPR Options

0001 thru 0189*		0198	0200	0250
0256	0300	0315	0360	0400
0500	0512	0580	0600	0800
1000	1024	1200	1250	1500+
1800	2000	2048	2500	2540
3000+	4096+	5000+	6000+	8192+
10,000+				

*Contact Customer Service For Availability

+Not available in 12V option

New CPR values are periodically added to those listed. Contact Customer Service to determine all currently available values. Special disk resolutions are available upon request and may be subject to a one-time NRE fee.

NOTES:

1 Contact Customer Service for additional options not shown.
2 Not available in all configurations, and not available with V1 Input Voltage. Contact Customer Service for availability.
3 Contact Customer Service for non-standard index gating or phase relationship options.
4 For non-standard English cable lengths enter 'F' plus cable length expressed in feet. Example: F06 = 6 feet of cable. Frequency above 300 kHz standard cable lengths only.
5 For non-standard metric cable lengths enter 'M' plus cable length expressed in meters. Example: M06 = 6 meters of cable.
6 Please refer to **Technical Bulletin TB100:** *When to Choose the CE Option* at www.encoder.com.
7 This mount requires button head screws and a modified Hex wrench. Order appropriate Installation Kit listed under Specifications.
8 Not available with commutation. 5-pin not available with Line Driver (HV ,OD, LO) outputs. Additional cable lengths available. Please consult Customer Service.
9 With Input Voltage above 16 VDC, operating temperature is limited to 85° C.
10 Only available with 5 VDC Input Voltage.

Model 15T Thru-Bore
Model 15H Hollow Bore

ENCODER PRODUCTS COMPANY

Model 15T/H Specifications

Electrical

- Input Voltage .....5 VDC ±10% Fixed Voltage
  12 VDC ±10% Fixed Voltage
  4.75 to 28 VDC max for temperatures up to 85° C
  4.75 to 24 VDC for temperatures between 85° to 100° C
- Input Current .....100 mA max (65 mA typical) with no output load
- Output Format .....Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the encoder mounting face. See *Waveform Diagrams* below.
- Output Types.....Open Collector- 20 mA max per channel
  Push-Pull- 20 mA max per channel
  Pull-Up- Open collector with 2.2K ohm Pull-Up 20 mA max per channel
  Line Driver- 20 mA max per channel (Meets RS 422 at 5 VDC supply)
- Index .....Once per revolution.
  190 to 10,000 CPR: Gated to output A
  1 to 189 CPR: Ungated
  See *Waveform Diagrams* below.
- Max. Frequency .....Standard Frequency Response is
  200 kHz for CPR 1 to 2540
  500 kHz for CPR 2541 to 5000
  1 MHz for CPR 5001 to 10,000
  Extended Frequency Response (optional) is
  300 kHz for CPR 2000, 2048, 2500, and 2540
- Noise Immunity .....Tested to BS EN61000-6-2; BS EN50081-2; BS EN61000-4-2; BS EN61000-4-3; BS EN61000-4-6; BS EN500811
- Symmetry .....180° (±18°) electrical
- Quad. Phasing .....90° (±22.5°) electrical
- Min. Edge Sep .....67.5° electrical
- Accuracy.....Within 0.017° mechanical or 1 arc-minute from true position. (for CPR>189)
- Commutation.....Up to 12 pole. Contact Customer Service for availability.
- Comm. Accuracy.....1° mechanical

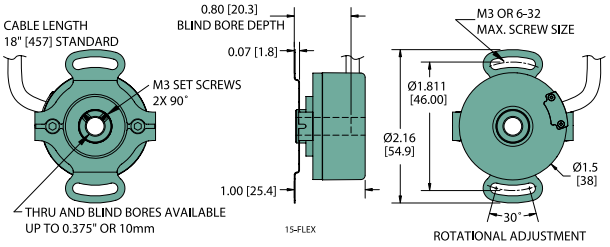
Mechanical

- Max Shaft Speed .....8000 RPM. Higher speeds may be achievable, contact Customer Service.
- Bore Size.....0.1875" through 0.375", 5 mm through 10 mm
- Bore Tolerance.....-0.0000" / +0.0006"
- User Shaft Tolerances
  - Radial Runout.....0.008" max
  - Axial Endplay.....±0.030" max
- Starting Torque.....IP50 Hollow Bore: 0.2 oz-in
  IP50 Thru-Bore: 0.3 oz-in
  IP64: 0.6 oz-in
- Moment of Inertia.....6.7 x 10^{-5} oz-in-sec^2 (4.8 gm-cm^2)
- Max Acceleration.....1 x 10^5 rad/sec^2
- Electrical Conn .....18" cable (foil and braid shield, 24 AWG conductors non-commutated, 28 AWG commutated), 5- or 8-pin M12 (12 mm) in-line connector with 18" cable (braid shield)
- Mounting.....1.812" (46 mm) Slotted Flex mount
  1.812" (46 mm) Two Hole Flex Mount
  1.142" (29 mm) Slotted Flex Mount
  1.2795" (32.5 mm) Slotted Flex Mount
  1.575" (40 mm) Slotted Flex Mount
  (See mechanical drawings for dimensions)
- Weight .....3 oz typical

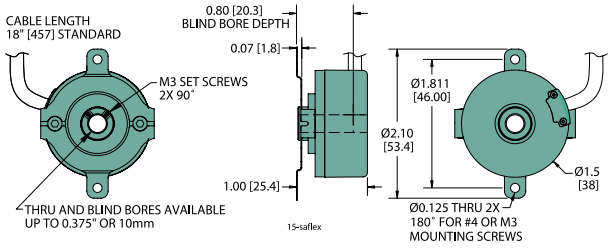
Environmental

- Operating Temp.....-20° to +85° C standard models
  -40° to +85° C for low temperature option
  -20° to +100° C for high temperature option
  -20° to +120° C for extreme temperature option
- Storage Temp.....-25° to +85° C
- Humidity.....98% RH non-condensing
- Vibration .....10 g @ 58 to 500 Hz
- Shock.....80 g @ 11 ms duration
- Sealing.....IP50 standard; IP64 available

Model 15T/H 1.811" (46 mm) Slotted Flex Mount (SF)

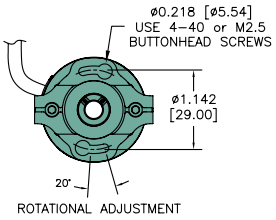


Model 15T/H 1.811" (46 mm) Two Hole Flex Mount (SA)

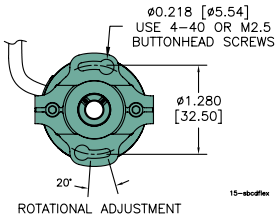


Model 15T/H Small Diameter Slotted Flex Mounts

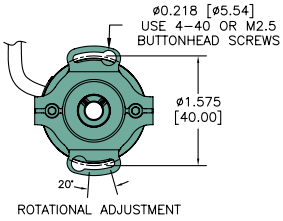
1.142" (29 mm): SB*



1.2795" (32.5 mm): SC*



1.575" (40 mm): SD*



Encoder Length and Diameter are the same as SF and SA mounts detailed above

All dimensions are in inches with a tolerance of ±0.005" or ±0.01" unless otherwise specified
Metric dimensions are given in brackets [mm]

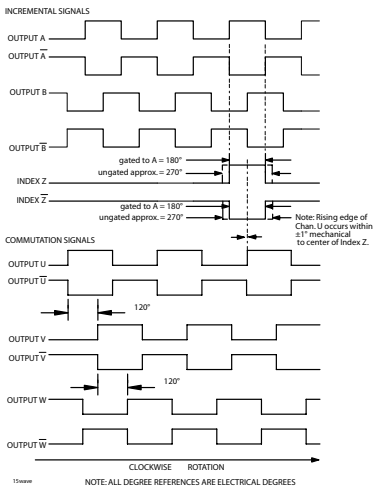
*** Order Appropriate No Charge Mounting and Installation Kit for SB, SC, or SD Option**

176150-01	Installation Kit, 4-40 Buttonhead Screws with 0.062" Shortened Hex Wrench
176149-01	Installation Kit, M 2.5 Buttonhead Screws with 1.5 mm Shortened Hex Wrench

Each kit contains 10 screws for mounting 5 encoders

"SB" Slotted Flex Mount

Waveform Diagrams



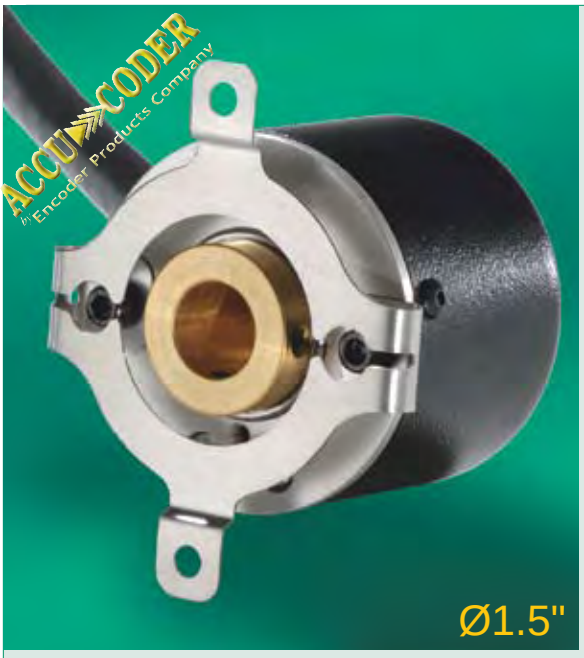
Wiring Table

Function	Cable Wire Color	5-pin M12**	8-pin M12**
Com	Black	3	7
+VDC	White	1	2
A	Brown	4	1
A'	Yellow	--	3
B	Red	2	4
B'	Green	--	5
Z	Orange	5	6
Z'	Blue	--	8
U	Violet	--	--
U'	Gray	--	--
V	Pink	--	--
V'	Tan	--	--
W	Red/Green	--	--
W'	Red/Yellow	--	--
Shield	Bare *	--	--

* CE Option: Cable shield (bare wire) is connected to internal case

**Non-CE Option: Cable shield is connected to M12 connector body. CE Option: Cable shield and M12 connector body is connected to internal case.

Model 755A Hollow Bore



Features

- Miniature Size (1.5" Diameter)
- Up to 30,000 Cycles Per Revolution
- Flex Mounting
- Large Hollow Bore Option (up to 0.750")
- High Temperature Option

The Model 755A Size 15 Accu-Coder™ is ideal for applications requiring a small, high precision, high performance encoder. Approximately 1.5" in diameter and 1.5" long, it will fit where many encoders cannot. All metal construction and shielded ball bearings provides years of trouble-free use. A variety of blind hollow bore sizes are available. Large bores allow for shafts up to 0.750" or 14 mm. Attaching directly to a motor is quick and simple with the innovative flex mount, first developed by EPC. This industry standard mount eliminates couplings, increases reliability, while reducing overall length and cost. Where critical alignment is required, a Slotted Flex (SF) is available. A perfect replacement encoder where high reliability is required.

Common Applications

Robotics, Assembly Machines, Motor-Mounted Feedback, Phototypesetters, Printers & Digital Plotters, Elevator Controls, Medical Diagnostic Equipment

Model 755A Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.

For specification assistance call Customer Service at 1-800-894-0412

755A - 01 - S - 1000 - R - HV - 1 - S - S - CE

MODEL
755A Model 755A

BORE SIZES[1]

15	3/16", 0.1875"	16	4 mm
01	1/4", 0.250"	18	5 mm
03	5/16", 0.3125"	04	6 mm
02	3/8", 0.375"	14	8 mm
10	1/2", 0.500"	05	10 mm
11	5/8", 0.625"	12	12 mm
17	3/4", 0.750"	13	14 mm

OPERATING TEMPERATURE
L -40° to 70° C
S 0° to 70° C
H 0° to 100° C[2]

CYCLES PER REVOLUTION
1-30,000
See *CPR Options* below for available resolutions.
Price adder for CPR >1270

NUMBER OF CHANNELS
A Channel A
Q Quadrature A & B
R Quadrature A & B with Index Z[3]

OUTPUT TYPE
5 - 28V In/Out[4]
OC Open Collector
PU Pull-Up Resistor
PP Push-Pull
HV Line Driver
8 - 28V In/5V Out[5,9]
H5 Line Driver
P5 Push-Pull

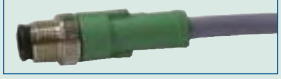
FREQUENCY RESPONSE
1 Standard 100 kHz
2 200 kHz
5 250 kHz, >3000 CPR
3 500 kHz, >6000 CPR[6]
4 1 MHz, >10,000 CPR[6]

MOUNTING
S Standard Flex Mount
SF Slotted Flex Mount

CONNECTOR TYPE
S Standard 18" Cable[7]
C01 8-pin Molex
C02 Terminal Block
J00 18" Cable with 5-pin M12[10]
K00 18" Cable with 8-pin M12[10]

CERTIFICATION
N None
CE CE Marked[8]

For enhanced connectivity, available with an M12 in-line connector



Model 755A CPR Options

0001*	0002*	0004*	0005*	0006*	0007*	0008*	0010*	0011*
0012*	0014*	0020	0021*	0024*	0025*	0028*	0030*	0032*
0033*	0034*	0035*	0038*	0040*	0042*	0045*	0050*	0060
0064*	0100	0120	0125	0128*	0144*	0150*	0160*	0200
0240*	0250	0254*	0256*	0300	0333*	0360	0400	0500
0512	0600	0625*	0635	0665*	0720	0768*	0800	0889
0900*	1000	1024	1200	1201*[a]	1203*[a]	1204*[a]	1250[a]	1270[a]
1440	1500	1800	2000	2048	2400[a]	2500	2540[a]	2880[a]
3000[a]	3600[a]	4000[a]	4096[a]	5000[a]	6000[a]	7200[a]	7500[a]	9000[a]
10,000[a]	10,240[a]	12,000[a]	12,500[a]	14,400[a]	15,000[a]	18,000[a]	20,000[a]	20,480[a]
25,000[a]	30,000[a]							

* Contact Customer Service for High Temperature Option.
[a] High Temperature Option (H) limited to 85° C maximum for these CPR options.

New CPR values are periodically added to those listed. Contact Customer Service to determine all currently available CPR values. Special disk resolutions are available upon request.
A one-time NRE fee may apply.

NOTES:
1 Contact Customer Service for additional options.
2 0° to 85° C for certain resolutions, see CPR Options.
3 Contact Customer Service for index gating options.
4 24 VDC max for high temperature option.
5 Standard temperature, 60 to 3000 CPR only.
6 Standard cable lengths only. For details, please refer to **Technical Bulletin TB116:** *Noise and Signal Considerations* at www.encoder.com.
7 For non-standard cable lengths, add a forward slash (/) plus cable length expressed in feet. Example: S/6 = 6 feet of cable.
8 Please refer to **Technical Bulletin TB100:** *When to Choose the CE Option.*
9 H5 and P5 outputs are not available with CE option.
10 5-pin not available with Line Driver (HV, H5) outputs. Additional cable lengths available. Please consult Customer Service.

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Model 755A Hollow Bore

Model 755A Specifications

Electrical

- Input Voltage: 4.75 to 28 VDC max for temperatures up to 70° C
  4.75 to 24 VDC for temperatures between 70° C to 100° C
- Input Current: 100 mA max with no output load
- Input Ripple: 100 mV peak-to-peak at 0 to 100 kHz
- Output Format: Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the encoder mounting face. See *Waveform Diagrams* below.
- Output Types: Open Collector- 100 mA max per channel
  Pull-Up- 100 mA max per channel
  Push-Pull- 20 mA max per channel
  Line Driver- 20 mA max per channel (Meets RS 422 at 5 VDC supply)
- Index: Occurs once per revolution. The index for units >3000 CPR is 90° gated to Outputs A and B. See *Waveform Diagrams* below.
- Freq Response: Up to 1 MHz
- Noise Immunity: Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2
- Symmetry: 1 to 6000 CPR: 180° (±18°) electrical at 100 kHz output
  6001 to 20,480 CPR: 180° (±36°) electrical
- Quad Phasing: 1 to 6000 CPR: 90° (±22.5°) electrical at 100 kHz output
  6001 to 20,480 CPR: 90° (±36°)
- Min Edge Sep: 1 to 6000 CPR: 67.5° electrical at 100 kHz output
  6001 to 20,480 CPR: 54° electrical
  >20,480 CPR: 50° electrical
- Rise Time: Less than 1 microsecond
- Accuracy: Instrument and Quadrature Error: For 200 to 1999 CPR, 0.017° mechanical (1.0 arc minutes) from one cycle to any other cycle. For 2000 to 3000 CPR, 0.01° mechanical (0.6 arc minutes) from one cycle to any other cycle. Interpolation error (units > 3000 CPR only) within 0.005° mechanical. (Total Optical Encoder Error = Instrument + Quadrature + Interpolation)

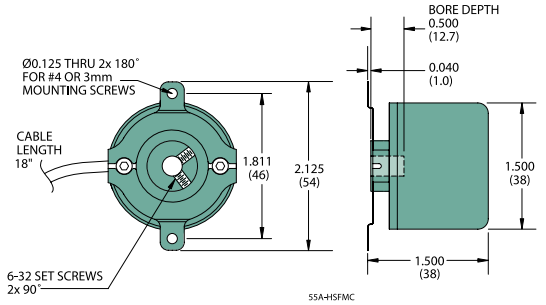
Mechanical

- Max Shaft Speed: 7500 RPM. Higher shaft speeds may be achievable, contact Customer Service.
- Bore Size: 0.1875", 0.250", 0.3125", 0.375", 0.500", 0.625", 0.750", 4 mm, 5 mm, 6 mm, 8 mm, 10 mm, 12 mm, 14 mm
- Bore Tolerance: -0.0000" / +0.0006"
- User Shaft Tolerances
  - Radial Runout: 0.007" max
  - Axial End Play: ±0.030" max
- Starting Torque: 0.14 oz-in typical
  4.0 oz-in typical for -40° C operation
- Moment of Inertia: 2.8×10^{-4} oz-in-sec^2
- Max Acceleration: 1×10^5 rad/sec^2
- Electrical Conn: 18" cable (foil and braid shield, 24 AWG conductors), 5- or 8-pin M12 (12 mm) in-line connector with 18" cable (braid shield), 8-pin Molex, Terminal Block
- Housing: Black non-corrosive finish
- Bearings: Precision ABEC ball bearings
- Mounting: Flex, and Slotted Flex Mounting
- Weight: 3.50 oz typical

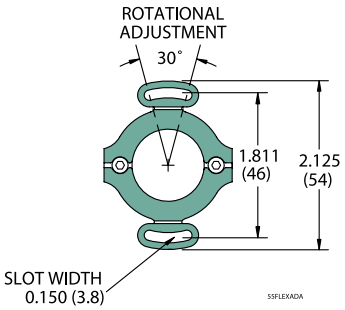
Environmental

- Operating Temp: 0° to 70° C for standard models
  -40° to 70° C for low temperature option
  0° to 100° C for high temperature option (0° to 85° C for certain resolutions, see CPR Options.)
- Storage Temp: -25° to +85° C
- Humidity: 98% RH non-condensing
- Vibration: 10 g @ 58 to 500 Hz
- Shock: 50 g @ 11 ms duration

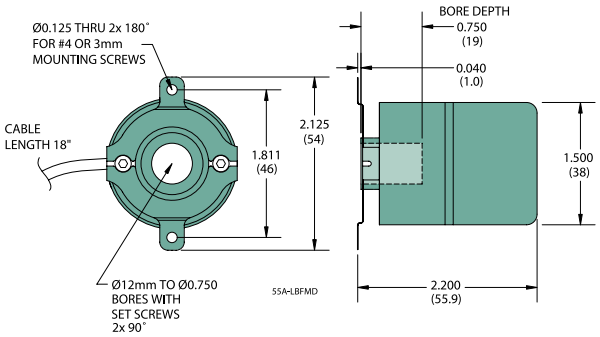
Model 755A Flex Mount (S)



Optional Slotted Flex Mount (SF)



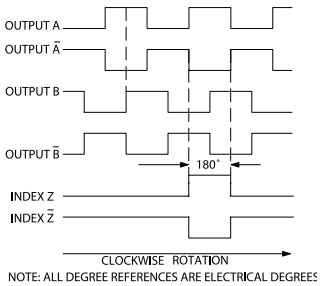
Model 755A Large Bore Flex Mount (S)



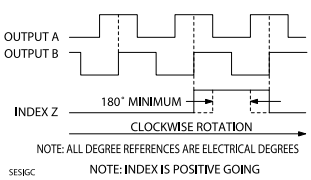
All dimensions are in inches with a tolerance of ±0.005" or ±0.01" unless otherwise specified
Metric dimensions are given in brackets [mm]

Waveform Diagrams

Line Driver and Push-Pull



Open Collector and Pull-Up



Wiring Table

Function	Cable Wire Color	Terminal Block	8-pin Molex	5-pin M12[2]	8-pin M12[2]
Com	Black	7	2	3	7
+VDC	White	8	1	1	2
A	Brown	1	8	4	1
A'	Yellow	2	7	-----	3
B	Red	3	4	2	4
B'	Green	4	3	-----	5
Z	Orange	6	6	5	6
Z'	Blue	5	5	-----	8
Shield	Bare[1]	-----	-----	-----	-----

[1]CE Option: Cable shield (bare wire) is connected to internal case
[2]CE Option: Read Technical Bulletin TB111

Model 121

Patent #6,608,300B2

Features

- Simple, Hassle Free Mounting
- Accepts Larger Shafts up to 5/8" (or 15 mm)
- Up to 12 Pole Commutation Available
- 0° to 100° C Operating Temperature Available
- Patented Design
- Includes New IP50 Dust Seal Kit

AT LAST! A reliable modular encoder that requires no calibration, gapping, or special tools to install! EPC has taken the performance of modular encoders to a new level with the Model 121 Auto-Aligning Modular Encoder. This new and innovative design provides simple, reliable, hassle free installation. Simply tighten the shaft clamp, install the mounting screws, and you're done!

The Model 121 incorporates the latest Optical ASIC technology for greatly enhanced performance. Common problems with other modular encoder designs are warping and deflection, caused by their extensive use of plastic, both of which are virtually eliminated by the Model 121's all metal construction. For brushless servo motor applications, the Model 121 can be specified with three commutation tracks to provide motor feedback. The optional 100° C temperature capability allows servo motors to operate at higher power outputs and duty cycles.

Common Applications

Servo Motor Control, Robotics, Specialty Assembly Machines, Digital Plotters, High Power Motors

Model 121 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.

121	-	N	-	A	-	5	-	01	-	S	-	0256	-	Q	-	OC	-	1	-	S	-	N

MODEL
121 Auto-Aligning Modular Thru-Bore

COMMUTATION[1]
N No Commutation
C4 4 Pole
C6 6 Pole
C8 8 Pole
C12 12 Pole

MOUNTING & HOUSING STYLE
A Mounting Style A

INPUT VOLTAGE
5 5 VDC
12 12 VDC

BORE SIZE[2]
01 1/4", 0.250"
03 5/16", 0.3125"
02 3/8", 0.375"
10 1/2", 0.500"
11 5/8", 0.625"
06 5 mm
04 6 mm
14 8 mm
05 10 mm
12 12 mm
13 14 mm
15 15 mm

OPERATING TEMPERATURE
S 0° to 70° C
H 0° to 100° C

CYCLES PER REVOLUTION
See *CPR Options* below
Price adder >1250

NUMBER OF CHANNELS
Q Quadrature A & B
R Quadrature A & B with Index Z[4]

OUTPUT TYPE
OC Open Collector
PP Push-Pull
HV Line Driver

FREQUENCY RESPONSE
1 100 kHz
2 200 kHz
3 300 kHz[3]

CONNECTOR TYPE
S 18" Cable[5]

CERTIFICATION
N None
CE CE Marked[6]

For specification assistance call Customer Service at 1-800-894-0412

Model 121 CPR Options

0200	0250	0254	0256	0300	0360	0500
0512	0600	0720	0800	0840	1000	1024
1200	1250	1800	2000*	2048*	2500*	2540*

*Contact Customer service for application analysis

New CPR values are periodically added to those listed. Contact Customer Service to determine all currently available values. Special disk resolutions are available upon request and may be subject to a one-time NRE fee.

NOTES:
1 Not available in all configurations. Contact Customer Service for availability.
2 Contact Customer Service for additional options not shown.
3 Standard 0° to 70° C operating temperature only.
4 Contact Customer Service for non-standard index gating options.
5 For Non-Standard Cable Lengths add a forward slash (/) plus cable length expressed in feet. Example: S/6 = 6 feet of cable.
6 Please refer to Technical Bulletin TB100: *When to Choose the CE Option* at www.encoder.com.

Model 121

Model 121 Specifications

Electrical

Input Voltage.....5 VDC ±10% Fixed Voltage
12 VDC ±10% Fixed Voltage
Input Current.....100 mA maximum with no output load
Output Format.....Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the mounting face. Index optional
Output Types.....Open Collector- 20 mA per channel max
Push-Pull- 20 mA per channel max
Line Driver- 20 mA max per channel (Meets RS 422 at 5 VDC supply)
Index.....Once per revolution gated to channel A. Contact Customer Service for additional gating options.
Freq. Response.....100 kHz standard, 200 kHz, and 300 kHz optional
Symmetry.....180° (±18°) electrical at 100 kHz
Quad. Phasing.....90° (±22.5°) electrical at 100 kHz
Min. Edge Sep.....67.5° electrical at 100 kHz
Accuracy.....Within 0.1° mechanical from one cycle to any other cycle, or 6 arc minutes
Commutation.....Optional- three 120° electrical phase tracks for commutation feedback. (4, 6, 8, or 12 poles. Others available upon request)
Comm. Accuracy.....1° mechanical

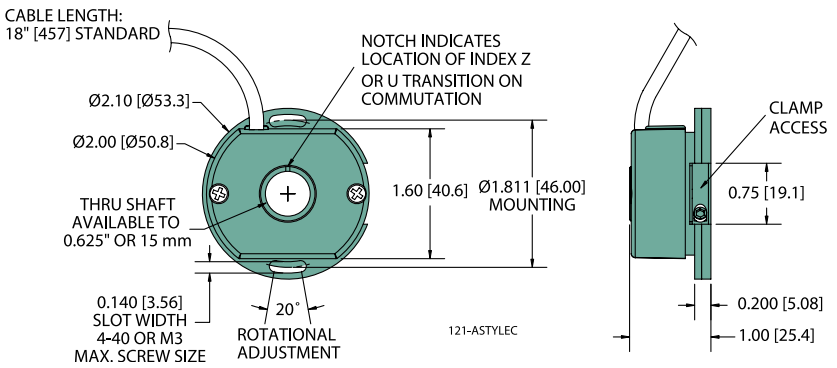
Mechanical

Max. Shaft Speed.....Determined by maximum frequency response
Bore Size.....0.250" through 0.625"
5 mm through 15 mm
Bore Tolerance.....+0.0007" (max) -0.0000" (Based on H7 bore fit for g6 shaft Class LC5 per ANSI B-4.1 standard)
User Shaft Tolerance
Radial Runout.....0.002" max
Axial End Play.....±0.015" for CPR <= 512
±0.010" for CPR 513 to 1250
±0.005" for CPR > 1250
Moment of Inertia.....2.5×10^{-4} oz-in-sec^2
Max. Acceleration.....5×10^5 rad/sec^2
Electrical Conn.....18" cable (foil and braid shield, 24 AWG conductors non-commutated, 28 AWG commutated)
Housing.....All Metal Aluminum and Zinc Alloy
Mounting.....Two screws on a 1.812" Dia. B.C. (4-40 or M3 maximum screw size)
Weight.....4 oz typical

Environmental

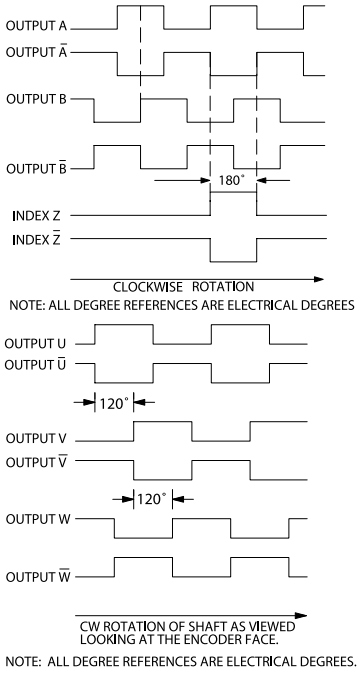
Operating Temp.....0° to 70° C for standard models
0° to 100° C for high temperature option
Storage Temp.....-25° to +100° C
Humidity.....98% RH non-condensing
Vibration.....10 g @ 58 to 500 Hz
Shock.....50 g @ 11 ms duration

Model 121 Auto-Aligning Modular (A)



All dimensions are in inches with a tolerance of ±0.005" or ±0.01" unless otherwise specified
Metric dimensions are given in brackets [mm]

Waveform Diagrams



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES

COMM-SIGA

Wiring Table

Function	Cable Wire Color
Com	Black
+VDC	White
A	Brown
A'	Yellow
B	Red
B'	Green
Z	Orange
Z'	Blue
U	Violet
U'	Gray
V	Pink
V'	Tan
W	Red/Green
W'	Red/Yellow
Shield	Bare *

*CE Option: Cable shield (bare wire) is connected to internal case

Model 260

New M12 Body Mount

Features

- Low Profile 1.19"
- Up to 12 Pole Commutation
- Thru-Bore and Hollow Bore (Blind) Styles
- Simple, Innovative Flexible Mounting System
- Incorporates Opto-ASIC Technology
- CE marking available

The Model 260's larger bore (up to 0.625") and low profile make it the perfect solution for many machine and motor applications. Available in two distinct formats - a Hollow Bore and a complete Thru-Bore - the Model 260 uses EPC's pioneering Opto-ASIC design. The Model 260 uses EPC's innovative anti-backlash mounting system, allowing simple, reliable, and precise encoder attachment. Unlike traditional kit or modular encoder designs, it's integral bearing set provides stable and consistent operation without concerns for axial or radial shaft runout. For brushless servo motor applications, the Model 260 can be specified with three 120° electrical phase tracks to provide up to 12 pole commutation feedback. The optional extended temperature capability allows servo motors to operate at higher power outputs and duty cycles.

Common Applications

Brushless Servo Motor Commutation, Robotics, Motor-Mounted Feedback, Assembly Machines, Digital Plotters, High Power Motors

Model 260 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.

260 - N - T - 01 - S - 0256 - Q - OC - 1 - S - SF - 1 - N

MODEL
260 Ultra Versatile Commutated Thru-Bore

COMMUTATION[2]
N No Commutation
C4 4 Pole
C6 6 Pole
C8 8 Pole
C12 12 Pole

HOUSING STYLE
B Hollow Bore (Blind)
T Front Clamp Thru-Bore
R Rear Clamp Thru-Bore

BORE SIZE[1]
01 1/4", 0.250"
02 3/8", 0.375"
10 1/2", 0.500"
11 5/8", 0.625"
06 5 mm
04 6 mm
14 8 mm
05 10 mm
09 11 mm
12 12 mm
13 14 mm
15 15 mm

OPERATING TEMPERATURE[3]
L -40° to 70° C
S 0° to 70° C
H 0° to 100° C
V 0° to 120° C

CYCLES PER REVOLUTION
1-2500[1]
See *CPR Options* below
Price adder >1270

NUMBER OF CHANNELS
Q Quadrature A & B
R Quadrature A & B with Index Z[4]

OUTPUT TYPE
OC Open Collector
PP Push-Pull
HV Line Driver

MAXIMUM FREQUENCY
1 Standard
2 Extended
See Specifications For Explanation

CONNECTOR TYPE
S 18" Cable[5]
J00 18" Cable with 5-pin M12[7]
K00 18" Cable with 8-pin M12[7]
SMJ 5-pin Body Mount M12[7]
SMK 8-pin Body Mount M12[7]

MOUNTING
SD 1.575" (40 mm) BC Flex Mount
SF 1.811" (46 mm) BC Flex Mount
XF 2.250" BC 3-point Flex Mount
NF 2.375" BC 3-point Flex Mount
FA Flex Arm
FB Flex Arm

SEALING
1 IP50 for Thru-Bore
2 IP64 for Thru-Bore
3 IP64 for Hollow Bore
4 IP50 for Hollow Bore

CERTIFICATION
N None
CE CE Marked[6]

For enhanced connectivity, available with an M12 in-line connector

For specification assistance call Customer Service at 1-800-894-0412

Model 260 CPR Options

0001 thru 0189*	0200	0250	0254	0256	0300	
0360	0400*	0500	0512	0600	0720	0800
0840	1000	1024	1200	1220	1250	1270
1500	1800	2000	2048	2500	2540	3000
4096	5000	6000	8192	10,000		

*Contact Customer service for availability

Contact Customer Service for other disk resolutions; not all disk resolutions available with every commutation option.

NOTES:
1 Contact Customer Service for additional options not shown.
2 Not available in all configurations. Contact Customer Service for availability.
3 5 to16 VDC supply only for H option; 5 VDC supply only for V option. Contact Customer Service for availability and additional information.
4 Contact Customer Service for non-standard index gating options.
5 For non-standard cable lengths add a forward slash (/) plus cable length expressed in feet. Example: S/6 = 6 feet of cable. Frequency above 300 kHz standard cable lengths only.
6 Please refer to Technical Bulletin TB100: *When to Choose the CE Option* at www.encoder.com.
7 Not available with commutation or extreme temperature (V) option. 5-pin not available with Line Driver (HV) output. Additional cable lengths available. Please consult Customer Service.

Model 260

Model 260 Specifications

Electrical

Input Voltage	4.75 to 28 VDC for temperatures up to 70° C 5 to 16 VDC for 0° to 100° C operating temperature 5 VDC for 0° to 120° C operating temperature
Input Current	100 mA max with no output load
Output Format	Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the mounting face. See *Waveform Diagrams* below.
Output Types	Open Collector- 20 mA max per channel Push-Pull- 20 mA max per channel Line Driver- 20 mA max per channel (Meets RS 422 at 5 VDC supply)
Index	Once per revolution gated to channel A. See *Waveform Diagrams* below.
Max. Frequency	Standard Frequency Response is 200 kHz for CPR 1 to 2540 500 kHz for CPR 2541 to 5000 1 MHz for CPR 5001 to 10,000 Extended Frequency Response (optional) is 300 kHz for CPR 2000, 2048, 2500, and 2540
Noise Immunity	Tested to BS EN61000-6-2; BS EN50081-2; BS EN61000-4-2; BS EN61000-4-3; BS EN61000-4-6, BS EN55011
Symmetry	180° (±18°) electrical
Quad. Phasing	90° (±22.5°) electrical
Min. Edge Sep	67.5° electrical
Accuracy	Within 0.01° mechanical from one cycle to any other cycle, or 0.6 arc minutes.
Commutation	Up to 12-pole. Contact Customer Service for availability.
Comm. Accuracy	1° mechanical

Mechanical

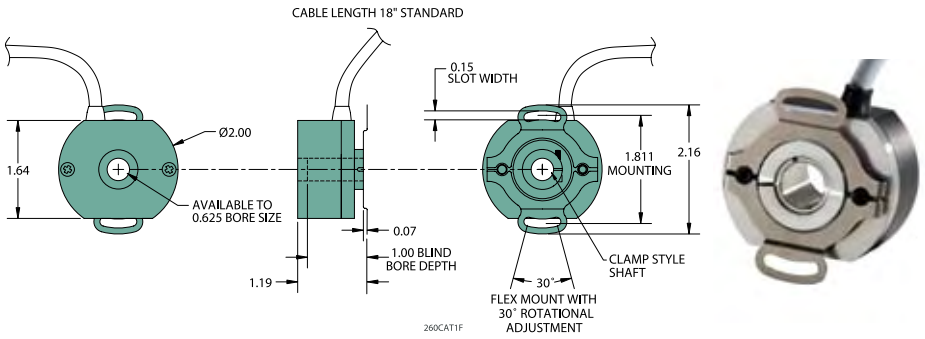
Max Shaft Speed	7500 RPM. Higher shaft speeds may be achievable, contact Customer Service. Note: For extreme temperature operation, de-rate temperature by 5° C for every 1000 RPM above 3000 RPM
Bore Size	0.250" through 0.625" 5 mm through 15 mm
Bore Tolerance	-0.0000" / +0.0006"
User Shaft Tolerances	
Radial Runout	0.007" max
Axial Endplay	±0.030" max
Starting Torque	IP50 Thru-Bore: 0.50 oz-in IP50 Hollow Bore: 0.30 oz-in IP64 Thru-Bore: 2.50 oz-in IP64 Hollow Bore: 2.0 oz-in Note: Add 3.0 oz-in for -40° C operation
Moment of Inertia	3.9 X 10^{-4} oz-in-sec^2
Max Acceleration	1 X 10^5 rad/sec^2
Electrical Conn	18" cable (foil and braid shield, 24 AWG conductors non-commutated, 28 AWG commutated), 5- or 8-pin M12 (12 mm) in-line connector with 18" cable (foil and braid shield)
Housing	Black non-corrosive finish
Mounting	Slotted Flex Mount standard, additional flex mount options available (see Ordering Guide)
Weight	3.5 oz typical

Environmental

Operating Temp	0° to 70° C for standard models -40° to 70° C for low temperature option 0° to 100°C for high temperature option 0° to 120° C for extreme temperature option
Storage Temp	-40° to +100° C
Humidity	98% RH non-condensing
Vibration	10 g @ 58 to 500 Hz
Shock	50 g @ 11 ms duration
Sealing	IP50; IP64 available

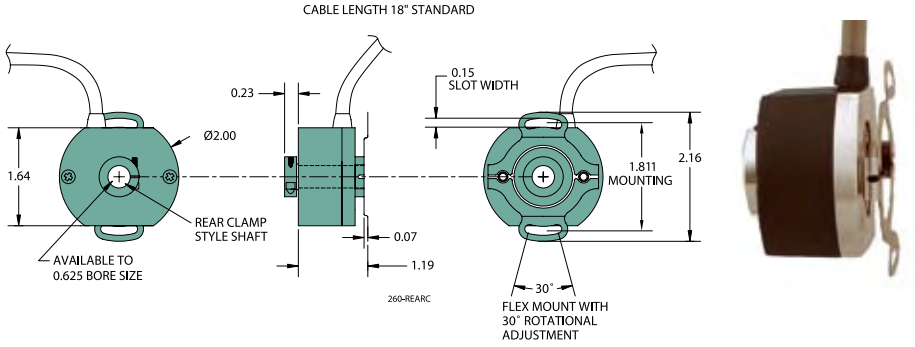
Model 260 With Front Shaft Clamp (T)

With 1.811" (46 mm) BC Slotted Flex (SF)

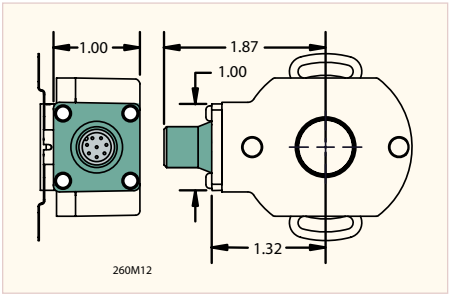


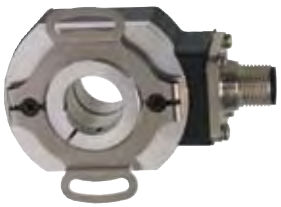
Model 260 Rear Clamp (R)

With 1.811" (46 mm) BC Slotted Flex (SF)



Body Mount M12 (SMJ, SMK)

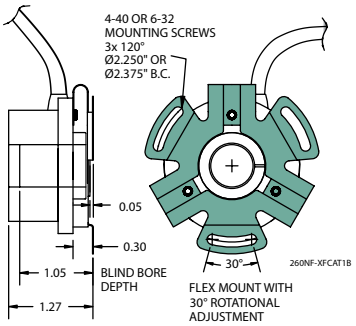




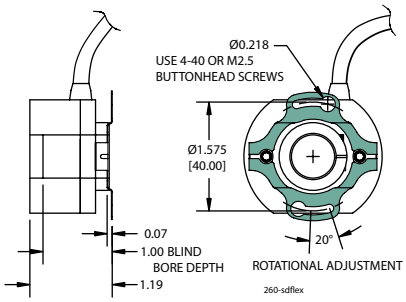
All dimensions are in inches with a tolerance of ±0.005" or ±0.01" unless otherwise specified

Model 260 Additional Mounts

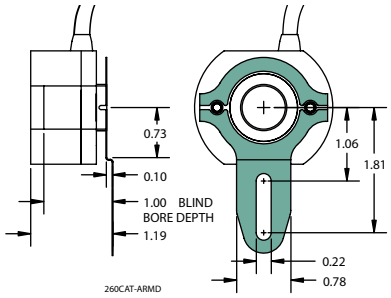
Three Point Flex Mount (XF, NF)

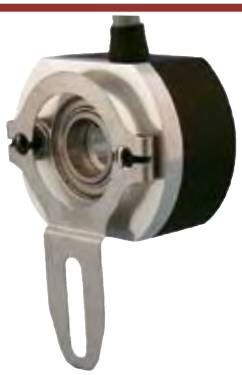


1.575" (40 mm) BC Flex Mount (SD)

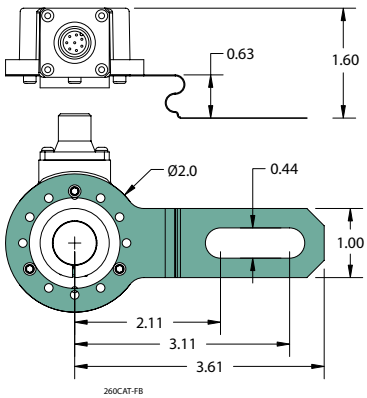


Flex Arm (FA)



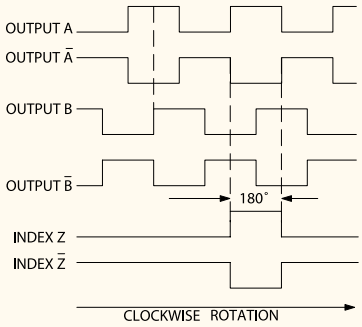


Flex Arm (FB)



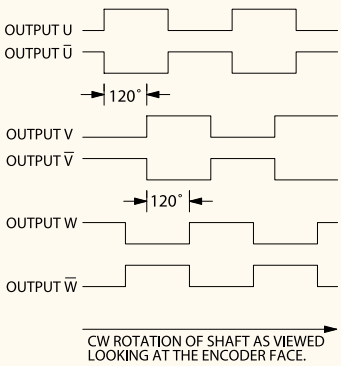
All dimensions are in inches with a tolerance of ±0.005" or ±0.01" unless otherwise specified

Waveform Diagrams



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES

LDSIGC



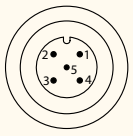
NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES.

COMM-SIGA

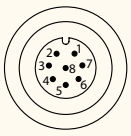
Wiring Table

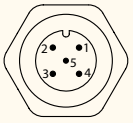
Function	Cable Wire Color	5-pin M12**	8-pin M12**	
Com	Black	3	7	* CE Option: Cable shield (bare wire) is connected to internal case **Non-CE Option: Cable shield is connected to M12 connector body. CE Option: Cable shield and M12 connector body is connected to internal case.
+VDC	White	1	2	
A	Brown	4	1	
A'	Yellow	--	3	
B	Red	2	4	
B'	Green	--	5	
Z	Orange	5	6	
Z'	Blue	--	8	
U	Violet	--	--	
U'	Gray	--	--	
V	Pink	--	--	
V'	Tan	--	--	
W	Red/Green	--	--	
W'	Red/Yellow	--	--	
Shield	Bare *	--	--	

Connector Pin-Outs

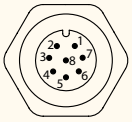


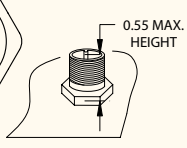
cordsets





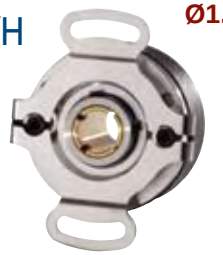
connectors





Small Motor Solutions

ENCODER PRODUCTS COMPANY

Model	Opto-ASIC	Hi-Temp	IP64/IP65 Seal	M12 Option	Features/Benefits	Brush Servo	Brushless Servo	Stepper	PMDC	NEMA (Small)
260 Ø2.0"	√	√	√	√	• Robust Bearing Unit With Durable Housing • Optional Commutation for BLDC Servo Applications • Bore Sizes up to 0.625" or 15 mm • Sealing to IP64 • Temperatures up to 120° C • Universal Mounting Options for Application Flexibility	√	√	√	√	√
121 Ø2.1"	√	√		√	• Bearingless Design for High RPM Applications • All Metal Construction vs. Competitor's Plastic Throwaways • Patented 1-2-3 Installation Of Gapping and Centering • Bore Sizes up to 0.625" or 15 mm • Optional Commutation	√	√	√		
15T/H Ø1.5" 	√	√	√	√	• Multiple Flex Options for Foreign Cross- Referencing • Bores up to 0.375" or 10 mm • Resolution to 2540 CPR (10,000 CPR pending) • Sealing Option to IP64 • Temperatures up to 120° C • Optional Commutation	√	√	√	√	
755A NEMA NEMA 23/34		√			• NEMA 23 or 34 with A Variety of Shaft Sizes • Integrated Mounting and Coupling • Coupling Provides Thermal Transfer Barrier • Frequency Response to 1 MHz • Resolutions to 30,000 CPR	√		√		√
225 Ø2.25"				√	• Low Cost Tachometer Replacement • Bores to 0.875" or 22 mm • Single Channel or Quadrature Models • Variety of Connection Options • Every Resolution from 1 to 600 (Single Channel)				√	√
15S Ø1.5"	√	√	√	√	• Host of Shaft Mount Options for Foreign Cross Referencing • Sealing Option to IP64 • Heavy Duty Cable Strain Relief • Variety of Connection Options • Temperatures up to 120° C • Resolution to 2540 CPR (10,000 CPR pending)	√		√		

ACCU CODER by Encoder Products Company

Rev A 01/19/07

CTi Automation - Phone: 800.894.0412 - Fax: 208.368.0415 - Web: www.ctiautomation.net - Email: info@ctiautomation.net

Model 702 Hollow Bore

Features

- Standard Size 20 Package (2" x 2")
- Up to 30,000 CPR
- Easy Installation
- IP64 Sealing Optional

The Model 702 Size 20 Accu-Coder™ is an ultra-rugged, reliable, yet compact industry standard 2-inch diameter encoder designed for harsh factory and plant floor environments. Installation is quick and simple, with a wide range of bore sizes, and a flex mount design that easily slips over motor or machine shafts. Installation takes up less space, since no shaft couplings or mounting brackets are required. Electrical protection from reverse voltage and output short circuits, allows for worry free wiring. A variety of connector options are available for easy integration into your system. With its ultra-rugged construction, and numerous configuration options, the Model 702 is the ideal choice for a wide variety of industrial applications.

Common Applications

Motion Control Feedback, Conveyors, Elevator Controls, Machine Control, Food Processing, Process Control, Robotics, Material Handling, Textile Machines

Model 702 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.

702 - 01 - S - 1000 - R - HV - 1 - H - 2 - E - X - N - CE

MODEL
702 Size 20 (2.0")

BORE SIZE[1]
01 1/4", 0.250"
03 5/16", 0.3125"
02 3/8", 0.375"
10 1/2", 0.500"
11 5/8", 0.625"
14 8 mm
05 10 mm
13 14 mm

OPERATING TEMPERATURE
S 0° to 70° C
H 0° to 100° C[2]

CYCLES PER REVOLUTION
1-30,000
See *CPR Options* below for available resolutions.
Price adder for CPR >1270

NUMBER OF CHANNELS
A Channel A
Q Quadrature A & B
R Quadrature A & B with Index Z[3]

OUTPUT TYPE
5-28V In/Out[4]
OC Open Collector
PU Pull-Up Resistor
PP Push-Pull
HV Line Driver[9]
8-28V In/5V Out[5,11]
H5 Line Driver[9]
P5 Push-Pull

FREQUENCY RESPONSE
1 100 kHz (Standard)
2 200 kHz
5 250 kHz, >3000 CPR
3 500 kHz, >6000 CPR[6]
4 1 MHz, >10,000 CPR[6]

MOUNTING
H 2.250" B.C. Flex Mount
M 2.375" B.C. Flex Mount

SEAL
N No Seal
2 IP64

CONNECTOR LOCATION
E End
S Side

CONNECTOR TYPE[10]
W 6-pin MS Style
Y 7-pin MS Style
X 10-pin MS Style
9D 9-pin D-subminiature
J 5-pin M12 (12 mm)
K 8-pin M12 (12 mm)
G Gland, 24" Cable[7]

MATING CONNECTOR
N No
Y Yes

CERTIFICATION
N None
CE CE Marked[8]

For specification assistance call Customer Service at 1-800-894-0412

Model 702 CPR Options

0001*	0002*	0004*	0005*	0006*	0007*	0008*	0010*	0011*
0012*	0014*	0020	0021*	0024*	0025*	0028*	0030*	0032*
0033*	0034*	0035*	0038*	0040*	0042*	0045*	0050*	0060
0064*	0100	0120	0125	0128*	0144*	0150*	0160*	0200
0240*	0250	0254*	0256*	0300	0333*	0360	0400	0500
0512	0600	0625*	0635	0665*	0720	0768*	0800	0889
0900*	1000	1024	1200	1201*[a]	1203*[a]	1204*[a]	1250[a]	1270[a]
1440	1500	1800	2000	2048	2400[a]	2500	2540[a]	2880[a]
3000[a]	3600[a]	4000[a]	4096[a]	5000[a]	6000[a]	7200[a]	7500[a]	9000[a]
10,000[a]	10,240[a]	12,000[a]	12,500[a]	14,400[a]	15,000[a]	18,000[a]	20,000[a]	20,480[a]
25,000[a]	30,000[a]							

* Contact Customer Service for High Temperature Option.
[a] High Temperature Option (H) limited to 85° C maximum for these CPR options.

New CPR values are periodically added to those listed. Contact Customer Service to determine all currently available CPR values. Special disk resolutions are available upon request.
A one-time NRE fee may apply.

NOTES:
1 Contact Customer Service for additional options.
2 0° to 85° C for certain resolutions, see CPR Options.
3 Contact Customer Service for non-standard index gating options.
4 24 VDC max for high temp option.
5 Standard temperature, 60 to 3000 CPR only.
6 Standard cable lengths only. For details, please refer to Technical Bulletin TB 116: *Noise and Signal Considerations* on the web at www.encoder.com.
7 For non-standard cable lengths, add a forward slash (/) plus cable length expressed in feet. Example: G/6 = 6 feet of cable.
8 Please refer to Technical Bulletin TB100: *When to Choose the CE Option*.
9 Not available with 5-pin M12 or 6-pin MS Style connector. 7-pin MS Style connector only available without Index Z.
10 For Mating Connectors, Cables, and Cordsets see Electrical Accessories on the web at www.encoder.com.
11 H5 and P5 outputs are not available with CE option, or any End Mount MS Connector.

CTi Automation - Phone: 800.894.0412 - Fax: 208.368.0415 - Web: www.ctiautomation.net - Email: info@ctiautomation.net

Model 702 Hollow Bore

Model 702 Specifications

Electrical

- Input Voltage: 4.75 to 28 VDC max for temperatures up to 70° C
  4.75 to 24 VDC for temperatures between 70° C to 100° C
- Input Current: 100 mA max with no output load
- Input Ripple: 100 mV peak-to-peak at 0 to 100 kHz
- Output Format: Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the encoder mounting face. See *Waveform Diagrams* below.
- Output Types: Open Collector- 100 mA max per channel
  Pull-Up- 100 mA max per channel
  Push-Pull- 20 mA max per channel
  Line Driver- 20 mA max per channel (Meets RS 422 at 5 VDC supply)
- Index: Occurs once per revolution. The index for units >3000 CPR is 90° gated to Outputs A and B. See *Waveform Diagrams* below.
- Freq Response: Up to 1 MHz
- Noise Immunity: Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2
- Symmetry: 1 to 6000 CPR: 180° (±18°) electrical at 100 kHz output
  6001 to 20,480 CPR: 180° (±36°) electrical
- Quad Phasing: 1 to 6000 CPR: 90° (±22.5°) electrical at 100 kHz output
  6001 to 20,480 CPR: 90° (±36°) electrical
- Min Edge Sep: 1 to 6000 CPR: 67.5° electrical at 100 kHz output
  6001 to 20,480 CPR: 54° electrical
  >20,480 CPR: 50° electrical
- Rise Time: Less than 1 microsecond
- Accuracy: Instrument and Quadrature Error : For 200 to 1999 CPR, 0.017° mechanical (1.0 arc minutes) from one cycle to any other cycle. For 2000 to 3000 CPR, 0.01° mechanical (0.6 arc minutes) from one cycle to any other cycle. Interpolation error (units > 3000 CPR only) within 0.005° mechanical. (Total Optical Encoder Error = Instrument + Quadrature + Interpolation)

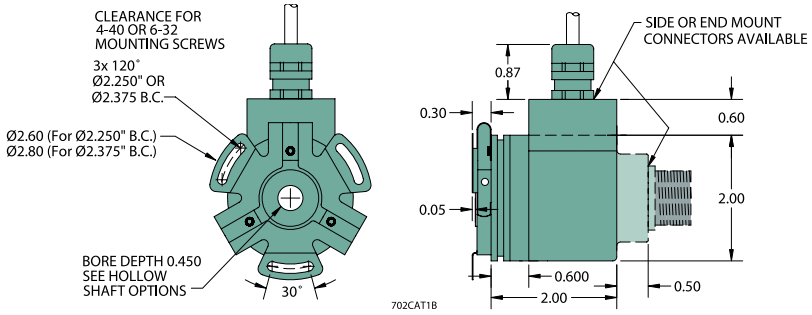
Mechanical

- Max Shaft Speed: 8000 RPM. Higher shaft speeds may be achievable, contact Customer Service.
- Bore Size: 0.250", 0.3125, 0.375", 0.500", 0.625", 8 mm, 10 mm or 14 mm
  Note: Bore sizes 1/2", 5/8", and 14 mm are clamp style. All others are set screw style.
- Bore Tolerance: +0.0006" / -0.0000"
- User Shaft Tolerances
  - Radial Runout: 0.007" max
  - Axial Endplay: ±0.030" max
- Starting Torque: 1.0 oz-in typical with IP64 seal or no seal
- Moment of Inertia: 5.2×10^{-4} oz-in-sec^2
- Max Acceleration: 1×10^5 rad/sec^2
- Electrical Conn: 6-, 7-, and 10-pin MS Style, 5- or 8-pin M12 (12 mm), 9-pin D-subminiature, or gland with 24 inches of cable (foil and braid shield, 24 AWG conductors)
- Housing: Black non-corrosive finish
- Bearings: Precision ABEC ball bearings
- Mounting: Flex mount
- Weight: 11 oz typical

Environmental

- Operating Temp: 0° to 70° C standard models
  0° to 100° C for high temperature option (0° to 85° C for certain resolutions, see CPR Options.)
- Storage Temp: -25° to +85° C
- Humidity: 98% RH non-condensing
- Vibration: 20 g @ 58 to 500 Hz
- Shock: 75 g @ 11 ms duration
- Sealing: IP64

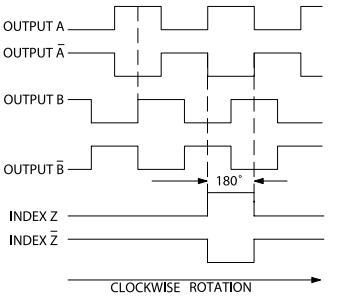
Model 702 Flex Mount (H, M)



Note: Bore sizes 1/2", 5/8", and 14 mm are clamp style. All others are set screw style.
All dimensions are in inches with a tolerance of ±0.005" or ±0.01" unless otherwise specified

Waveform Diagrams

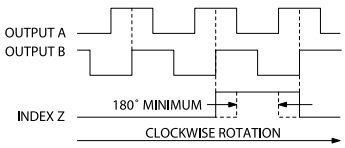
Line Driver and Push-Pull



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES

LDSIGC

Open Collector and Pull-Up



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES

SESIGC

NOTE: INDEX IS POSITIVE GOING

Wiring Table

Function	Gland Cable Wire Color	5-pin M12[2]	8-pin M12[2]	10-pin MS	7-pin MS HV,H5	7-pin MS PU, PP, OC, P5	6-pin MS PU, PP OC, P5	9-pin D-sub
Com	Black	3	7	F	F	F	A, F	9
+VDC	Red	1	2	D	D	D	B	1
A	White	4	1	A	A	A	D	2
A'	Brown	----	3	H	C	----	----	3
B	Blue	2	4	B	B	B	E	4
B'	Violet	----	5	I	E	----	----	5
Z	Orange	5	6	C	----	C	C	6
Z'	Yellow	----	8	J	----	----	----	7
Case	Green	----	----	G	G	G	----	8
Shield	Bare[1]	----	----	----	----	----	----	----

[1]CE Option: Cable shield (bare wire) is connected to internal case
[2]CE Option: Read Technical Bulletin TB111

Model 225

Features

- Single Channel & Quadrature Models
- Easy To Mount Economical Thru-Bore Design
- Metal Construction
- Bore Sizes To 0.875" or 22 mm

Controlling motor speed is essential for many production assembly machines or robotic equipment. For tachometer feedback, or motor speed control applications, the Model 225 Accu-Coder™ is the ideal encoder choice. The Model 225 Accu-Coder™ is a Thru-Bore encoder available in both single channel (225A) and quadrature (225Q) models. It provides a cost effective solution for simple measurement. Features including an all metal housing, a variety of connector options, and easy installation due to the Thru-Bore design, make the Model 225 Accu-Coder™ ideal for many motion control and manufacturing applications.

Common Applications

Brushless Servo Motor Commutation, Robotics, Motor-Mounted Feedback, Assembly Machines, Digital Plotters, High Power Motors

Model 225 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.

225Q - 10 - 100 - OC - N - N - K

MODEL
225A Single Channel
225Q Quadrature

CYCLES PER REVOLUTION
See *CPR Options* below
225A 1 - 600 CPR
225Q 1 - 100 CPR

OUTPUT TYPE
OC Open Collector
PU Pull-Up Resistor

BORE SIZE

01	1/4", 0.250"	07	7 mm
03	5/16", 0.3125"	05	10 mm
02	3/8", 0.375"	06	11 mm
10	1/2", 0.500"	12	12 mm
56	9/16", 0.562"	14	14 mm
11	5/8", 0.625"	15	15 mm
68	11/16", 0.6875"	16	16 mm
34	3/4", 0.750"	17	17 mm
18	7/8", 0.875"	19	19 mm
		20	20 mm
		22	22 mm

MOUNTING
N No Additional Mounting
F Flex Arm Kit

SEAL
N No Seal (Standard)
Y Bearing Seals[1]

CONNECTOR TYPE
S 6 ft Cable[2]
T Terminal Block
9D 9-pin D-subminiature
J 5-pin M12 (12 mm)
K 8-pin M12 (12 mm)

For specification assistance call Customer Service at 1-800-894-0412

Model 225A/Q CPR Options

225A
1-600 CPR, all resolutions

225Q

001	002	003	004	005	006	010	011
015	016	020	022	025	030	032	040
048	050	060	062	080	083	090	099
100							

Contact Customer Service for other disk resolutions

NOTES:
1 Shaft speed limited to 400 RPM.
2 For Non-Standard Cable Lengths add a forward slash (/) plus cable length expressed in feet. Example: S/12 = 12 feet of cable.

Model 225

Model 225A Specifications
Single Channel

Electrical

Input Voltage.....4.75 to 24 VDC
Input Current.....32 mA max with Pull-Up option
Input Ripple .....100 mV peak-to-peak at 0 to 100 kHz
Output Format .....Square wave 50% duty cycle
Output Types .....Open Collector- 100 mA max
Pull-Up- 20 mA max (1.5K)
Freq Response.....0 to 6 kHz
Rise Time.....Less than 1 microsecond
Cycles per Rev.....1 to 600

Mechanical

Max. Shaft Speed.....4000 RPM
Bore Size .....0.250" to 0.875"
7 mm to 22 mm (See Ordering Guide)

Bore Tolerance .....Bore H7 fit for g6 shaft Class LC5 per ANSI B-4.I Standard

Running Torque .....10 oz-in typical
Housing.....Black non-corrosive finish
Bearings.....Precision ABEC ball bearings
Electrical Conn .....6 feet cable with strain relief (shielded, 24 AWG conductors), 9-pin D-subminiature, 5- or 8-pin M12 (12 mm), Terminal Block
Weight.....8 oz typical

Environmental

Operating Temp.....0° to +70° C
Storage Temp.....-25° to +85° C
Humidity.....95% RH non-condensing
Vibration.....3 g @ 5 to 1000 Hz
Shock.....20 g @ 10 ms duration

Model 225Q Specifications
Quadrature

Electrical

Input Voltage.....4.75 to 24 VDC
Input Current.....64 mA max with Pull-Up option
Input Ripple .....100 mV peak-to-peak at 0 to 100 kHz
Output Format .....Square wave 50% duty cycle in quadrature

Output Types .....Open Collector- 100 mA max per channel

Pull-Up- 20 mA max per channel (1.5K)
Freq Response.....0 to 6 kHz
Rise Time.....Less than 1 microsecond
Cycles Per Rev.....1 to 100

Mechanical

Max. Shaft Speed.....4000 RPM
Bore Size .....0.250" through 0.875"
7 mm through 22 mm (see Ordering Guide)

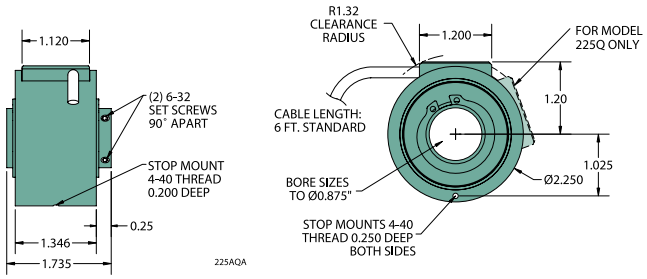
Bore Tolerance .....Bore H7 fit for g6 shaft Class LC5 per ANSI B-4.I Standard

Running Torque .....10 oz-in typical
Housing.....Black non-corrosive finish
Bearings.....Precision ABEC ball bearings
Electrical Conn .....6 feet cable with strain relief (shielded, 24 AWG conductors), 9-pin D-subminiature, 5- or 8-pin M12 (12 mm), Terminal Block
Weight.....10 oz typical

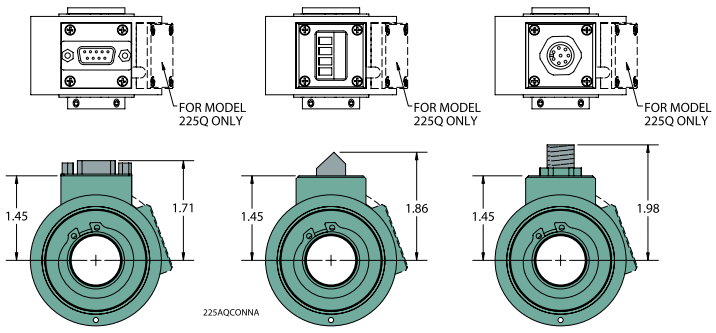
Environmental

Operating Temp.....0° to +70° C
Storage Temp.....-25° to +85° C
Humidity.....95% RH non-condensing
Vibration.....3 g @ 5 to 1000 Hz
Shock.....20 g @ 10 ms duration

Model 225

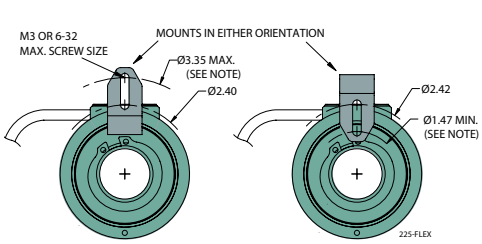


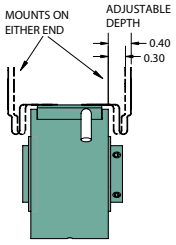
Model 225 Connector Options



Model 225 Mounting Option (F) Flex Arm Kit

To order Model 225 Flexible Mounting Arm Kit as an accessory, order Part # 140106-01. Kit may be mounted in either an up or down orientation.





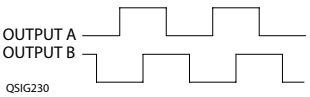
NOTE: FOR ANY CONNECTOR OPTION, THE BOLT CIRCLE RANGE IS FROM Ø1.72" TO Ø3.60" DUE TO THE INCREASED CAP HIEGHT

All dimensions are in inches with a tolerance of ±0.005" or ±0.01" unless otherwise specified

Wiring Table

Function	Gland Cable Wire Color	5-pin M12	8-pin M12	Term. Block	D-sub 9-pin
Com	Black	3	7	1	9
+VDC	Red	1	2	2	1
A	White	4	1	3	2
B	Green	2	4	4	4
Shield	Bare	----	----	----	----

Wavefom Diagram
Models 225A/Q



Model 775

ENCODER PRODUCTS COMPANY

Features

- Thru-Bore Design For Easy Mounting
- Bore Options to 1.375"
- Incorporates Opto-ASIC Technology
- Resolutions to 4096 CPR
- 100° C Operating Temperature Available
- CE Marking Available

The sleek design of the Model 775 Thru-Bore Series Accu-Coder™ makes form and function a successful reality. The slim profile and Thru-Bore design, makes installation easy by simply slipping the bore over motor shafts up to 1.375" in diameter. The advanced Opto-ASIC based electronics provide the superior noise immunity necessary in many industrial applications. With a variety of bore sizes, resolutions, and connector types, application possibilities are endless.

Common Applications

Motor Feedback, Velocity & Position Control, Food Processing, Robotics, Material Handling

Model 775 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.

775 - A - H - 1024 - Q - OC - A - Y - N - N - CE

MODEL
775 Slim Thru-Bore

HOUSING STYLE
A Completely encloses motor shaft, and eliminates access to motor shaft For physical protection only
B Thru-Bore housing version Allows access to motor shaft

OPERATING TEMPERATURE
S 0° to 70° C
H 0° to 100° C

CYCLES PER REVOLUTION
1 - 4096
See *CPR Options* below for available resolutions.
Price adder for CPR >1024

NUMBER OF CHANNELS
Q Quadrature A & B
R Quadrature A & B with Index Z[1]

OUTPUT TYPE
5 - 28V In/Out[2]
OC Open Collector
PU Pull-Up Resistor
PP Push-Pull
HV Line Driver[5]

BORE SIZE
A 5/8", 0.625" collet style
B 3/4", 0.750" collet style
C 7/8", 0.875" collet style
D 1", 1.000" collet style
O 1-1/8", 1.125" clamp style
T 1-1/4", 1.250" clamp style
V 1-3/8", 1.375" clamp style
H 14 mm collet style
I 19 mm collet style
K 24 mm collet style
M 25 mm clamp style
L 28 mm clamp style
Q 30 mm clamp style
R 32 mm clamp style

CONNECTOR TYPE
P Gland Nut with 24"Cable[3]
W 6-pin MS Style
Y 7-pin MS Style
X 10-pin MS Style
J 5-pin M12 (12 mm)
K 8-pin M12 (12 mm)
9D 9-pin D-subminiature

ANTI-ROTATION FLEX MOUNT
N None
A Style A

MATING CONNECTOR
N No Connector
Y Yes

CERTIFICATION
N None
CE CE Marked[4]

For specification assistance call Customer Service at 1-800-894-0412

Model 775 CPR Options

0060	0100	0120	0240	0250	0256
0500	0512	0600	1000	1024	2048
2500	4096				

Contact Customer Service for other disk resolutions; not all disk resolutions available with all output types

NOTES:
1 Contact Customer Service for index gating options.
2 5 to 24 VDC max for high temperature option.
3 For non-standard cable lengths, add a forward slash (/) plus cable length expressed in feet. Example: P/6 = 6 feet of cable.
4 Please refer to Technical Bulletin TB100: *When to Choose The CE Option* at www.encoder.com.
5 Not available with 5-pin M12 or 6-pin MS connector. Available with 7-pin MS connector only without Index Z.

Model 775

Model 775 Specifications

Electrical

- Input Voltage: 4.75 to 28 VDC max for temperatures up to 70° C
  4.75 to 24 VDC for temperatures between 70° C to 100° C
- Input Current: 100 mA max with no output load
- Input Ripple: 100 mV peak-to-peak at 0 to 100 kHz
- Output Format: Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the mounting face. See *Waveform Diagrams* below.
- Output Types: Open Collector- 100 mA max per channel
  Pull-Up- 100 mA max per channel
  Push-Pull- 20 mA max per channel
  Line Driver- 20 mA max per channel (Meets RS 422 at 5 VDC supply)
- Index: Once per revolution.
  0475 to 4096 CPR: Gated to output A
  0001 to 0474 CPR: Ungated
  See *Waveform Diagrams* below.
- Freq. Response: 200 kHz
- Noise Immunity: Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2
- Symmetry: 180° (±18°) electrical
- Quad. Phasing: 90° (±22.5°) electrical
- Min. Edge Sep: 67.5° electrical
- Rise Time: Less than 1 microsecond

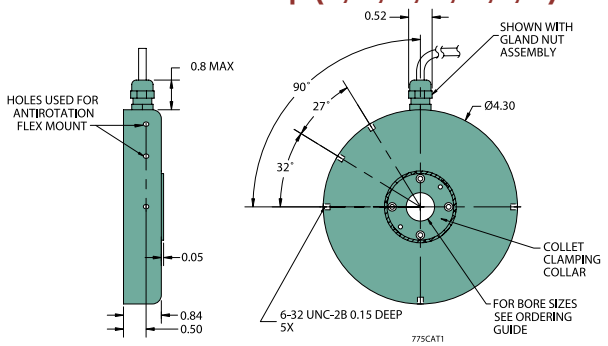
Mechanical

- Max Shaft Speed: 6000 RPM. Higher shaft speeds may be achievable, contact Customer Service.
- Bore Size: 0.625", 0.750" , 0.875", 1.000", 14 mm, 19 mm, 24 mm, 1.125", 1.250", 1.375", 25 mm, 28 mm, 30 mm, 32 mm
  Note: Bore sizes 1.125", 1.250", 1.375", 25 mm, 28 mm, 30 mm, 32 mm are clamp style. All others are collet style.
- User Shaft Tolerances
  - Radial Runout: 0.005"
  - Axial Endplay: ±0.030" with appropriate flex mount
- Moment of Inertia: 3.3 X 10^{-3} oz-in-sec^2 typical
- Electrical Conn: Gland nut with 24" cable (foil and braid shield, 24 AWG conductors), 6-, 7-, or 10-pin MS Style, 5- or 8-pin M12 (12 mm), 9-pin D-sub-miniature
- Housing: All metal construction
- Mounting: Thru-Bore with collet clamp or single-screw clamp mount
- Weight: 1.0 lb with gland nut or D-sub connector option
  1.5 lb with MS connector option
  Note: All weights typical

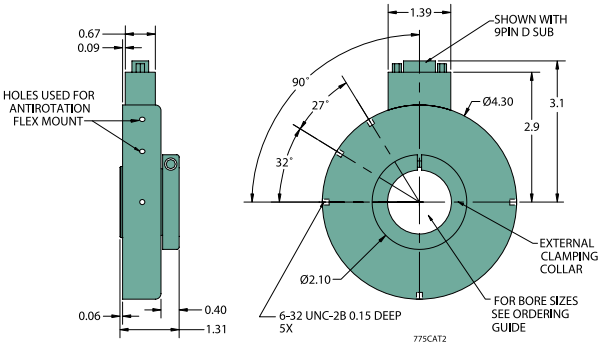
Environmental

- Operating Temp: 0° to 70° C for standard models
  0° to 100° C for high temperature option
- Storage Temp: -25° to 100° C
- Humidity: 98% RH non-condensing
- Vibration: 10 g @ 58 to 500 Hz
- Shock: 50 g @ 11 ms duration
- Sealing: IP50

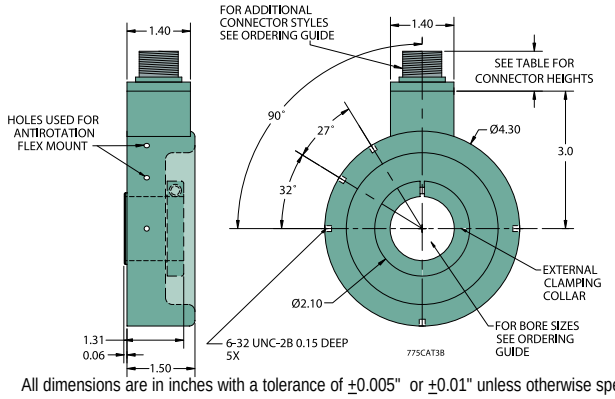
Model 775 Collet Clamp (A, B, C, D, H, I, K)



Model 775 Clamp Style (O, T, V, M, L, Q)



Model 775 Extended Housing (W, X, Y, J, K)

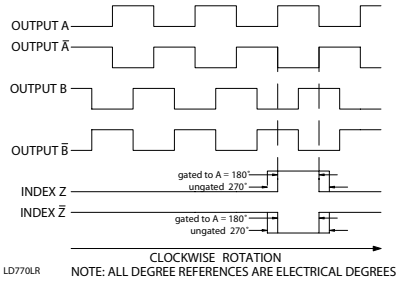


CONNECTOR TYPE	HEIGHT
6- or 7-PIN MS	0.67"
10-PIN MS	0.90"
5- or 8-PIN M12	0.50"

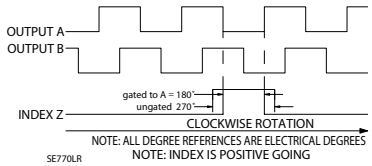
All dimensions are in inches with a tolerance of ±0.005" or ±0.01" unless otherwise specified

Waveform Diagrams

Line Driver and Push-Pull



Open Collector and Pull-Up



Wiring Table

Function	Gland Cable Wire Color	5-pin M12[4] PU, PP, OC	8-pin M12[4]	10-pin MS	7-pin MS HV	7-pin MS PU, PP, OC	6-pin MS PU, PP, OC	9-pin D-sub
Com	Black	3	7	F	F	F	A, F	9
+VDC	Red	1	2	D	D	D	B	1
A	White	4	1	A	A	A	D	2
A'	Brown	----	3	H	C	----	----	3
B	Blue	2	4	B	B	B	E	4
B'	Violet	----	5	I	E	----	----	5
Z	Orange	5	6	C	----	C	C	6
Z'	Yellow	----	8	J	----	----	----	7
Shield	Bare[1]	----	----	----	----	----	----	----
Case	----	----	----	G[2]	G[2]	G[2]	----	8[3]

[1]CE Option: Cable shield (bare wire) is connected to internal Case
[2]CE Option: Pin G is connected to Case
Non CE Option: Pin G has No Connection
[3]CE Option: Pin 8 is connected to Case
Non CE Option: Pin 8 has No Connection
[4]CE Option: Read Technical Bulletin "TB111" at www.encoder.com

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Model 776

Features

- Slim Profile - Only 1.36" In Depth
- Thru-Bore Design For Easy Mounting
- Incorporates Opto-ASIC Technology
- Resolutions to 4096
- Bore Options to 1.875"
- CE Marking Available

The Thru-Bore Series Accu-Coder™ Model 776 encoder is designed to fit directly on either a motor or other shaft where position, direction, or velocity information is needed. The advanced Opto-ASIC based electronics provide the superior noise immunity necessary in many industrial applications. The Model 776 conveniently features a clamp type mount for fast and easy mounting over a large range of shaft sizes. An optional anti-rotation flex mount maintains housing stability.

Common Applications

Motor Feedback, Velocity & Position Control, Robotics, Conveyors, Material Handling

Model 776 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.

776 - A - H - 1024 - Q - OC - C - Y - N - N - CE

MODEL
776 Slim Thru-Bore

OPERATING TEMPERATURE
S 0° to 70° C
H 0° to 100° C

HOUSING STYLE
A Completely encloses motor shaft, and eliminates access to motor shaft. For physical protection only.
B Thru-Bore housing version. Allows access to motor shaft.

CYCLES PER REVOLUTION
1 - 4096
See *CPR Options* below for available resolutions.
Price adder for CPR >1024

NUMBER OF CHANNELS
Q Quadrature A & B
R Quadrature A & B with Index Z[1]

OUTPUT TYPE
5 - 28V In/Out[2]
OC Open Collector
PU Pull-Up Resistor
PP Push-Pull
HV Line Driver[5]

BORE SIZE
G 1-7/16, 1.4375"
C 1-1/2", 1.500"
D 1-5/8", 1.625"
F 1-3/4", 1.750"
E 1-7/8", 1.875"
L 35 mm
I 38 mm
J 40 mm
M 42 mm
N 43 mm

CONNECTOR TYPE
P Gland Nut with 24"Cable[3]
W 6-pin MS Style
Y 7-pin MS Style
X 10-pin MS Style
J 5-pin M12 (12 mm)
K 8-pin M12 (12 mm)
9D 9-pin D-subminiature

ANTI-ROTATION FLEX MOUNT
N None
A Style A

MATING CONNECTOR
N No Connector
Y Yes

CERTIFICATION
N None
CE CE Marked[4]

For specification assistance call Customer Service at 1-800-894-0412

Model 776 CPR Options

0060	0100	0120	0240	0250	0256
0500	0512	0600	1000	1024	2048
2500	4096				

Contact Customer Service for other disk resolutions; not all disk resolutions available with all output types

NOTES:
1 Contact Customer Service for index gating options.
2 5 to 24 VDC max for high temperature option.
3 For non-standard cable lengths, add a forward slash (/) plus cable length expressed in feet. Example: P/6 = 6 feet of cable.
4 Please refer to Technical Bulletin TB100: *When to Choose the CE Option* at www.encoder.com.
5 Not available with 5-pin M12 or 6-pin MS connector. Available with 7-pin MS connector only without Index Z.

Model 776

Model 776 Specifications

Electrical

- Input Voltage: 4.75 to 28 VDC max for temperatures up to 70° C
  4.75 to 24 VDC for temperatures between 70° C to 100° C
- Input Current: 100 mA max with no output load
- Input Ripple: 100 mV peak-to-peak at 0 to100 kHz
- Output Format: Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the mounting face. See *Waveform Diagrams* below.
- Output Types: Open Collector- 100 mA max per channel
  Pull-Up- 100 mA max per channel
  Push-Pull- 20 mA max per channel
  Line Driver- 20 mA max per channel (Meets RS 422 at 5 VDC supply)
- Index: Once per revolution.
  0475 to 4096 CPR: Gated to output A
  0001 to 0474 CPR: Ungated
  See *Waveform Diagrams* below.
- Freq. Response: 200 kHz
- Noise Immunity: Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2
- Symmetry: 180° (±18°) electrical
- Quad. Phasing: 90° (±22.5°) electrical
- Min. Edge Sep: 67.5° electrical
- Rise Time: Less than 1 microsecond

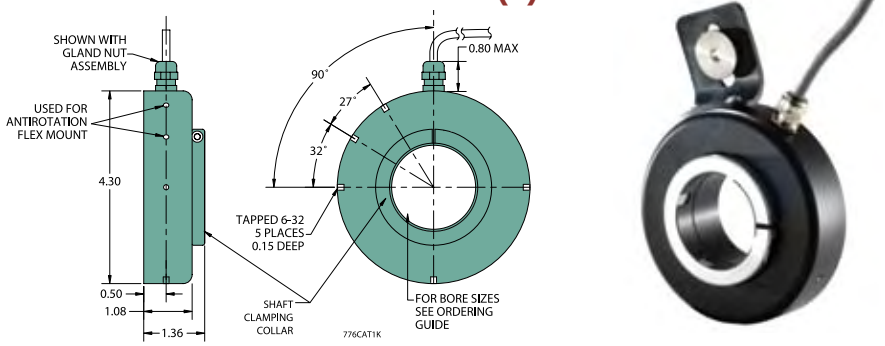
Mechanical

- Max Shaft Speed: 3500 RPM. Higher shaft speeds may be achievable, contact Customer Service.
- Bore Size: 1.500", 1.625", 1.750", 1.875", 35 mm, 38 mm, 40 mm, 42 mm, 43 mm
- User Shaft Tolerances
  - Radial Runout: 0.005"
  - Axial Endplay: ±0.030" with appropriate flex mount
- Moment of Inertia: 3.3 x 10^{-3} oz-in-sec^2 typical
- Electrical Conn: Gland nut with 24" cable (foil and braid shield, 24 AWG conductors), 6-, 7-, or 10-pin MS Style, 5- or 8-pin M12 (12 mm), or 9-pin D-sub- miniature
- Housing: All metal construction
- Mounting: Thru bore with single-screw clamp mount
- Weight: 1.0 lb with gland nut or D-sub connector option
  1.5 lb with MS connector option
  Note: All weights typical

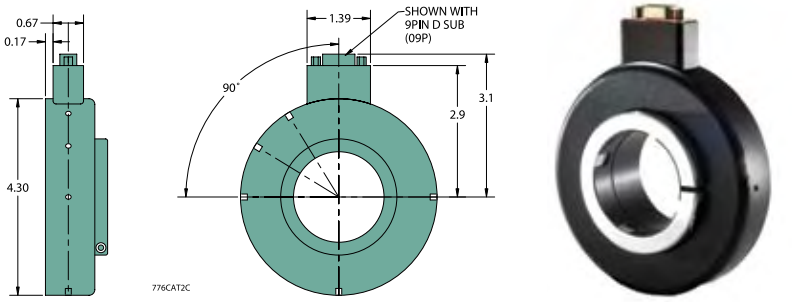
Environmental

- Operating Temp: 0° to 70° C for standard models
  0° to 100° C for high temperature option
- Storage Temp: -25° to 100° C
- Humidity: 98% RH non-condensing
- Vibration: 10 g @ 58 to 500 Hz
- Shock: 50 g @ 11 ms duration
- Sealing: IP50

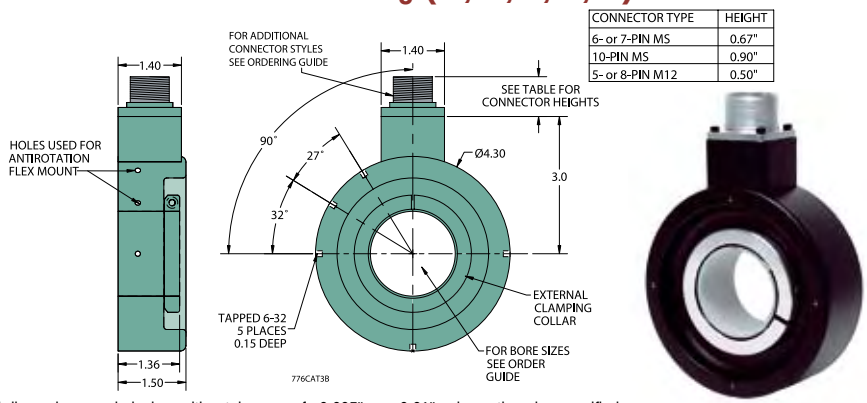
Model 776 With Gland Nut Cable (P)



Model 776 With 9-Pin D-Sub Connector (9D)



Model 776 Extended Housing (W, X, Y, J, K)

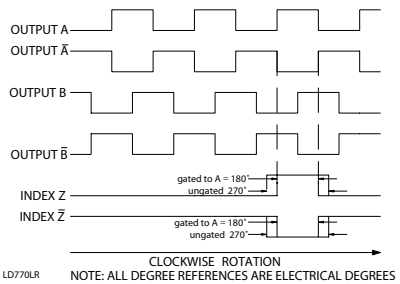


CONNECTOR TYPE	HEIGHT
6- or 7-PIN MS	0.67"
10-PIN MS	0.90"
5- or 8-PIN M12	0.50"

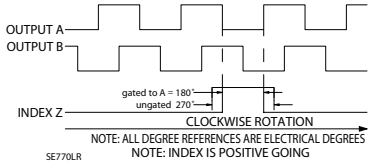
All dimensions are in inches with a tolerance of ±0.005" or ±0.01" unless otherwise specified

Waveform Diagrams

Line Driver and Push-Pull



Open Collector and Pull-Up



Wiring Table

Function	Gland Cable Wire Color	5-pin M12[4] PU, PP, OC	8-pin M12[4]	10-pin MS	7-pin MS HV	7-pin MS PU, PP, OC	6-pin MS PU, PP, OC	9-pin D-sub
Com	Black	3	7	F	F	F	A, F	9
+VDC	Red	1	2	D	D	D	B	1
A	White	4	1	A	A	A	D	2
A'	Brown	----	3	H	C	----	----	3
B	Blue	2	4	B	B	B	E	4
B'	Violet	----	5	I	E	----	----	5
Z	Orange	5	6	C	----	C	C	6
Z'	Yellow	----	8	J	----	----	----	7
Shield	Bare[1]	----	----	----	----	----	----	----
Case	----	----	----	G[2]	G[2]	G[2]	----	8[3]

[1]CE Option: Cable shield (bare wire) is connected to internal Case
[2]CE Option: Pin G is connected to Case
Non CE Option: Pin G has No Connection
[3]CE Option: Pin 8 is connected to Case
Non CE Option: Pin 8 has No Connection
[4]CE Option: Read Technical Bulletin "TB111" at www.encoder.com

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Model 770

Features

- Slim Profile - Only 0.975" Deep
- Fits NEMA Size 56C Thru 184C Motor Faces (4.5" AK)
- Incorporates Opto-ASIC Technology
- Resolutions to 4096 CPR

The Model 770 C-face encoder is a rugged, high resolution encoder designed to mount directly on NEMA C-face motors. Both sides of the encoder are C-face mounts, allowing additional C-face devices to be mounted to this encoder. Unlike many C-face kit type encoders, the Model 770 contains precision bearings and an internal flex mount, virtually eliminating encoder failures and inaccuracies induced by motor shaft runout or axial endplay. The advanced Opto-ASIC design provides advanced noise immunity necessary for many industrial applications. This encoder is ideal for applications using induction motors and flux vector control. The Model 770 provides speed and position information for drive feedback in a slim profile - only 0.975" thick. The Thru-Bore design allows fast and simple mounting of the encoder directly to the accessory shaft or to the drive shaft of the motor, using the standard motor face (NEMA sizes 56C - 184C). The tough, all metal housing resists the vibration and hazards of an industrial environment.

Common Applications

Motor Feedback, Velocity & Position Control, Conveyors, Variable Speed Drives, Mixing & Blending Motors, Assembly & Specialty Machines

Model 770 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.

770 - A - H - 1024 - Q - OC - A - Y - N - N - CE

MODEL
770 4.5" NEMA "AK" Dimension

OPERATING TEMPERATURE
S 0° to 70° C
H 0° to 100° C

CYCLES PER REVOLUTION
1 - 4096
See *CPR Options* below for available resolutions.
Price adder for CPR >1024

HOUSING STYLE
A Cover completely encloses motor shaft and eliminates access to motor shaft. IP65 rated
B Thru-Bore housing version with IP50 dust seal [1]

NUMBER OF CHANNELS
Q Quadrature A & B
R Quadrature A & B with Index Z [2]

OUTPUT TYPE
5 - 28V In/Out [3]
OC Open Collector
PU Pull-Up Resistor
PP Push-Pull
HV Line Driver [6]

BORE SIZE
A 5/8", 0.625"
B 3/4", 0.750"
C 7/8", 0.875"
D 1", 1.000"
H 14 mm
I 19 mm
K 24 mm

CONNECTOR TYPE
P 24" Cable with Gland Nut [4]
B Terminal Strip in Conduit Box
X 10-pin MS Style on Conduit Box
Y 7-pin MS Style on Conduit Box
J 5-pin M12 on Conduit Box
K 8-pin M12 on Conduit Box
L 10-pin Industrial Clamp

C-FACE GASKET KIT OPTION [1]
N No
Y Yes

MATING CONNECTOR
N No Connector
Y Yes

CERTIFICATION
N None
CE CE Marked [5]

For specification assistance call Customer Service at 1-800-894-0412

Model 770 CPR Options

0060	0100	0120	0240	0250	0256
0500	0512	0600	1000	1024	2048
2500	4096				

Contact Customer Service for other disk resolutions; not all disk resolutions available with all output types

NOTES:
1 Thru-Bore version may be IP65 sealed if mounted between two C-face devices with optional gasket kit. Select 'Yes' under C-face Gasket Kit Option.
2 Contact Customer Service for index gating options.
3 5 to 24 VDC max for high temperature option.
4 For non-standard cable lengths, add a forward slash (/) plus cable length expressed in feet. Example: P/6 = 6 feet of cable.
5 Please refer to Technical Bulletin TB100: *When to Choose the CE Option* at www.encoder.com.
6 Not available with 5-pin M12 connector. Available with 7-pin MS connector only without Index Z.

Model 770

Model 770 Specifications

Electrical

Input Voltage.....4.75 to 28 VDC max for temperatures up to 70° C
4.75 to 24 VDC for temperatures between 70° C to 100° C

Input Current.....100 mA max with no output load

Input Ripple .....100 mV peak-to-peak at 0 to 100 kHz

Output Format .....Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the mounting face. See *Waveform Diagrams* below.

Output Types .....Open Collector- 100 mA max per channel
Pull-Up- 100 mA max per channel
Push-Pull- 20 mA max per channel
Line Driver- 20 mA max per channel (Meets RS 422 at 5 VDC supply)

Index.....Once per revolution.
0475 to 4096 CPR: Gated to output A
0001 to 0474 CPR: Ungated
See *Waveform Diagrams* below.

Freq. Response.....200 kHz

Noise Immunity.....Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2

Symmetry .....180°(±18°) electrical

Quad. Phasing.....90°(±22.5°) electrical

Min. Edge Sep.....67.5° electrical

Rise Time.....Less than 1 microsecond

Mechanical

Max Shaft Speed.....6000 RPM. Higher shaft speeds may be achievable, contact Customer Service.

Bore Size.....0.625", 0.750", 0.875", 1.000", 14 mm, 19 mm, and 24 mm

Bore Tolerance ..... +0.0015"/-0.000"

User Shaft Tolerances
Radial Runout .....0.005"
Axial Endplay .....±0.015"

Moment of Inertia .....3.3 x 10^{-3} oz-in-sec^2 typical

Electrical Conn .....Gland nut with 24" cable (foil and braid shield, 24 AWG conductors), Terminal Strip in conduit box, 7- or 10-pin MS Style, 5- or 8-pin M12 (12 mm), 10-pin Industrial Clamp

Housing.....All metal construction

Mounting.....NEMA 56C to 184C

Weight.....2.60 lb with gland nut
3.00 lb with all other connector options
Note: All weights typical

Environmental

Operating Temp.....0° to 70° C for standard models
0° to 100° C for high temperature option

Storage Temp .....-25° to 100° C

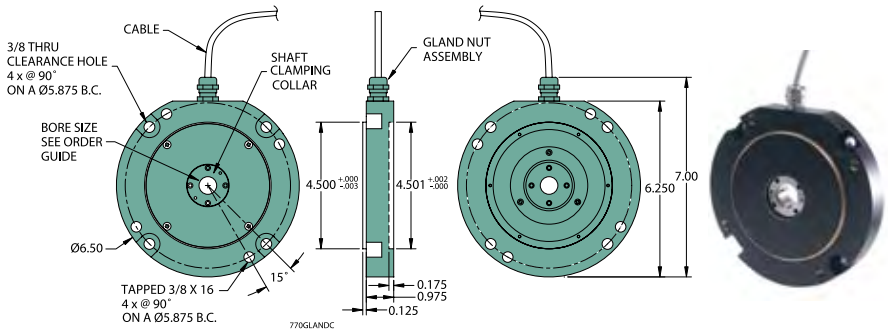
Humidity.....98% RH non-condensing

Vibration.....10 g @ 58 to 500 Hz

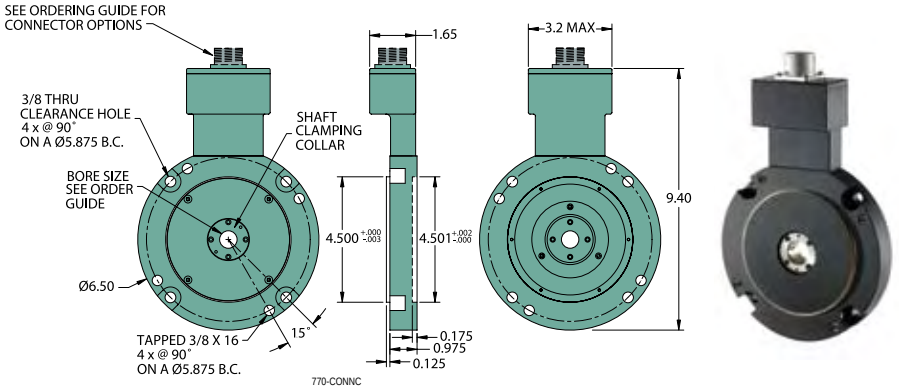
Shock.....50 g @ 11 ms duration

Sealing.....IP65 for Option A housing style with gasket kit
IP50 for Option B housing style

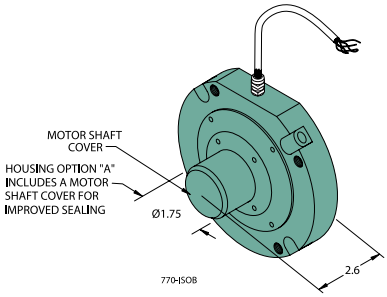
Model 770 With Gland Nut (P)



Model 770 With Conduit Box (B, X, Y, J, K)



Optional Housing Style (A)
Protective Cover

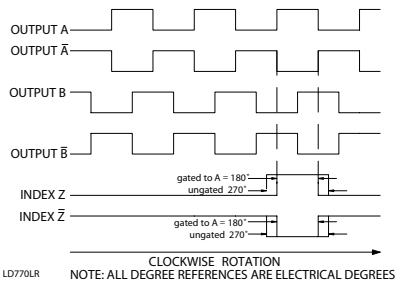


CONNECTOR TYPE	HEIGHT
6- or 7-PIN MS	0.67"
10-PIN MS	0.90"
5- or 8-PIN M12	0.50"

All dimensions are in inches with a tolerance of ±0.005" or ±0.01" unless otherwise specified

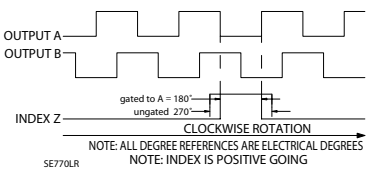
Waveform Diagrams

Line Driver and Push-Pull



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES

Open Collector and Pull-Up



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES
NOTE: INDEX IS POSITIVE GOING

Wiring Table

Function	Gland Cable Wire Color	5-pin M12[4] PU, PP, OC	8-pin M12[4]	10-pin MS	7-pin MS HV	7-pin MS PU, PP, OC	Term. Block	10-pin Indust. Clamp
Com	Black	3	7	F	F	F	2	1
+VDC	Red	1	2	D	D	D	1	6
A	White	4	1	A	A	A	3	3
A'	Brown	----	3	H	C	----	4	8
B	Blue	2	4	B	B	B	5	2
B'	Violet	----	5	I	E	----	6	7
Z	Orange	5	6	C	----	C	7	4
Z'	Yellow	----	8	J	----	----	8	9
Shield	Bare[1]	----	----	----	----	----	----	----
Case	----	----	----	G[2]	G[2]	G[2]	9[3]	10[3]

[1]CE Option: Cable shield (bare wire) is connected to internal Case
[2]CE Option: Pin G is connected to Case
Non CE Option: Pin G has No Connection
[3]CE Option: Pin 10 is connected to Case
Non CE Option: Pin has No Connection
[4]CE Option: Read Technical Bulletin "TB111" at www.encoder.com

Model 771

Features

- Large Bore size to 1.875" or 43 mm
- Fits NEMA Size 182TC Thru 256TC Motor Faces (8.5" AK)
- Incorporates Opto-ASIC Technology
- Resolutions to 4096 CPR

The Model 771 C-face encoder is a rugged, high resolution encoder designed to mount directly on NEMA C-face motors. Both sides of the encoder are C-face mounts, allowing additional C-face devices to be easily mounted. Many competitive C-face units are kit type encoders, but the Model 771 contains precision bearings and an internal flex mount that virtually eliminates encoder failures and inaccuracies induced by motor shaft runout or axial endplay. The advanced Opto-ASIC design provides superior noise immunity necessary for many industrial applications. This encoder is ideal for applications using induction motors and flux vector control. A Thru-Bore design allows fast and simple mounting of the encoder directly to the accessory shaft or drive shaft of a motor using a NEMA standard motor face (sizes 182TC - 256TC). The tough, all metal housing resists the vibration and hazards of an industrial environment.

Common Applications

Motor Feedback, Velocity & Position Control, Servo Control Systems, Assembly & Specialty Machines, Elevator Controls

Model 771 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.

771 - A - H - 1024 - Q - OC - A - Y - N - N

MODEL
771 8.5" NEMA "AK" Dimension

OPERATING TEMPERATURE
S 0° to 70° C
H 0° to 100° C

CYCLES PER REVOLUTION
1 - 4096
See *CPR Options* below for available resolutions.
Price adder for CPR >1024

OUTPUT TYPE
5 - 28V In/Out[3]
OC Open Collector
PU Pull-Up Resistor
PP Push-Pull
HV Line Driver[5]

BORE SIZE

A	1-1/8", 1.125"	H	28 mm
K	1-1/4", 1.250"	Q	30 mm
B	1-3/8", 1.375"	R	32 mm
C	1-1/2", 1.500"	L	35 mm
D	1-5/8", 1.625"	I	38 mm
F	1-3/4", 1.750"	J	40 mm
E	1-7/8", 1.875"	M	42 mm
		N	43 mm

C-FACE GASKET KIT OPTION[1]
N No
Y Yes

MATING CONNECTOR
N No Connector
Y Yes

HOUSING STYLE
A Cover completely encloses motor shaft and eliminates access to motor shaft. IP65 rated
B Thru-Bore housing version with IP50 dust seal[1]

NUMBER OF CHANNELS
Q Quadrature A & B
R Quadrature A & B with Index Z[2]

CONNECTOR TYPE
P Gland Nut with 24" cable[4]
B Terminal Strip in Conduit Box
X 10-pin MS Style on Conduit Box
Y 7-pin MS Style on Conduit Box
J 5-pin M12 (12 mm) on Conduit Box
K 8-pin M12 (12 mm) on Conduit Box
L 10-pin Industrial Clamp Style

For specification assistance call Customer Service at 1-800-894-0412

Model 771 CPR Options

0060	0100	0120	0240	0250	0256
0500	0512	0600	1000	1024	2048
2500	4096				

Contact Customer Service for other disk resolutions; not all disk resolutions available with all output types

NOTES:
1 Thru-Bore version may be IP65 sealed if mounted between two C-face devices with optional gasket kit. Select 'Yes' under C-face Gasket Kit Option.
2 Contact Customer Service for index gating options.
3 5 to 24 VDC max for high temperature option.
4 For non-standard cable lengths, add a forward slash (/) plus cable length expressed in feet. Example: P/6 = 6 feet of cable.
5 Not available with 5-pin M12 connector. Available with 7-pin MS connector only without Index Z.

Model 771

Model 771 Specifications

Electrical

- Input Voltage: 4.75 to 28 VDC max for temperatures up to 70° C
  4.75 to 24 VDC for temperatures between 70° C to 100° C
- Input Current: 100 mA max with no output load
- Input Ripple: 100 mV peak-to-peak at 0 to 100 kHz
- Output Format: Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the mounting face. See *Waveform Diagrams* below.
- Output Types: Open Collector- 100 mA max per channel
  Pull-Up- 100 mA max per channel
  Push-Pull- 20 mA max per channel
  Line Driver- 20 mA max per channel (Meets RS 422 at 5 VDC supply)
- Index: Once per revolution.
  0475 to 4096 CPR: Gated to output A
  0001 to 0474 CPR: Ungated
  See *Waveform Diagrams* below.
- Freq. Response: 200 kHz
- Noise Immunity: Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2
- Symmetry: 180° (±18°) electrical
- Quad. Phasing: 90° (±22.5°) electrical
- Min. Edge Sep: 67.5° electrical
- Rise Time: Less than 1 microsecond

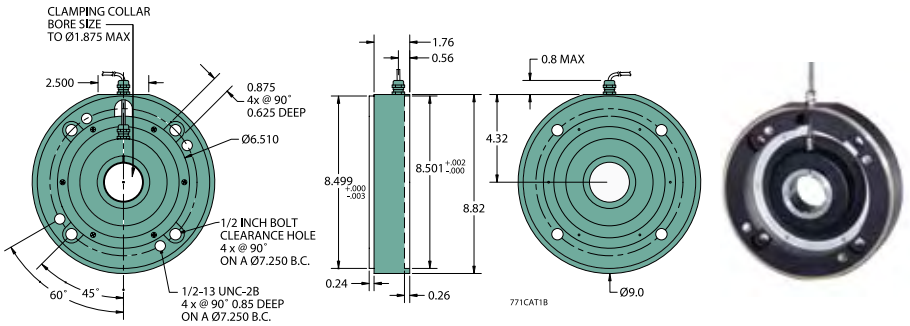
Mechanical

- Max Shaft Speed: 3500 RPM. Higher shaft speeds may be achievable, contact Customer Service.
  6000 RPM for 1.125", 1.250", 1.375", 28 mm, 30 mm, 32 mm bore diameter
- Bore Size: 1.125", 1.250", 1.375", 1.500", 1.625", 1.750", 1.875", 28 mm, 30 mm, 32 mm, 35 mm, 38 mm, 40 mm, 42 mm, and 43 mm
- User Shaft Tolerances
  - Radial Runout: 0.005"
  - Axial Endplay: ±0.1"
- Moment of Inertia: 3.3 x 10^{-3} oz-in-sec^2 typical
- Electrical Conn: Gland nut with 24" cable (foil and braid shield, 24 AWG conductors), Terminal Strip in conduit box, 7- or 10-pin MS Style, 5- or 8-pin M12 (12 mm), 10-pin Industrial Clamp
- Housing: All metal construction
- Mounting: NEMA 182TC-256TC (8.5" AK)
- Weight: 7.0 lb typical

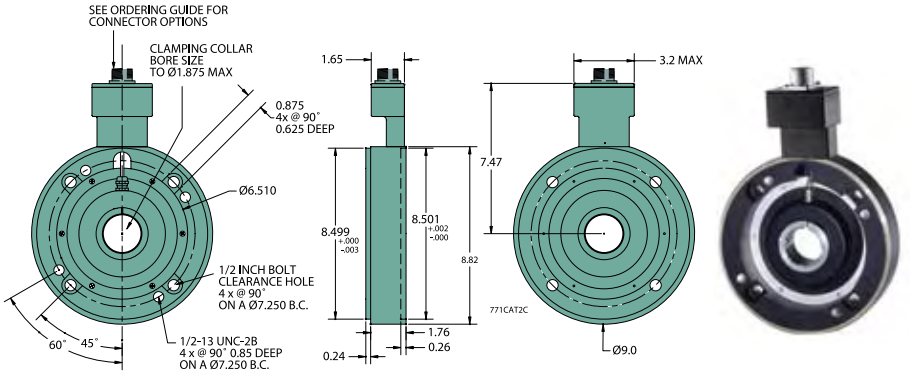
Environmental

- Operating Temp: 0° to 70° C for standard models
  0° to 100° C for high temperature option
- Storage Temp: -25° to 100° C
- Humidity: 98% RH non-condensing
- Vibration: 10 g @ 58 to 500 Hz
- Shock: 50 g @ 11 ms duration
- Sealing: IP65 for Option A housing style with gasket kit
  IP50 for Option B housing style

Model 771 With Gland Nut Cable (P)

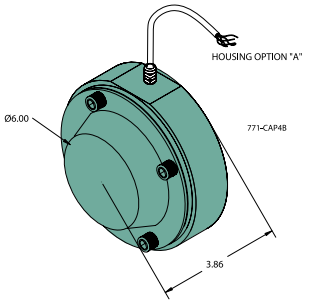


Model 771 With Conduit Box (B, X, Y, J, K)



CONNECTOR TYPE	HEIGHT
6- or 7-PIN MS	0.67"
10-PIN MS	0.90"
5- or 8-PIN M12	0.50"

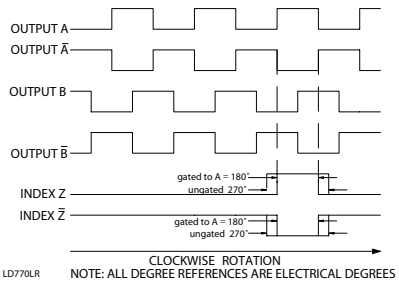
Optional Housing Style (A) Protective Cover



All dimensions are in inches with a tolerance of ±0.005" or ±0.01" unless otherwise specified

Waveform Diagrams

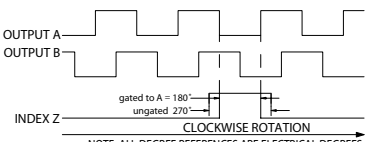
Line Driver and Push-Pull



LD770LR

NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES

Open Collector and Pull-Up



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES

NOTE: INDEX IS POSITIVE GOING

SE770LR

Wiring Table

Function	Gland Cable Wire Color	5-pin M12[4] PU, PP, OC	8-pin M12[4]	10-pin MS	7-pin MS HV	7-pin MS PU, PP, OC	Term. Block	10-pin Indust. Clamp
Com	Black	3	7	F	F	F	2	1
+VDC	Red	1	2	D	D	D	1	6
A	White	4	1	A	A	A	3	3
A'	Brown	----	3	H	C	----	4	8
B	Blue	2	4	B	B	B	5	2
B'	Violet	----	5	I	E	----	6	7
Z	Orange	5	6	C	----	C	7	4
Z'	Yellow	----	8	J	----	----	8	9
Shield	Bare[1]	----	----	----	----	----	----	----
Case	----	----	----	G[2]	G[2]	G[2]	9[3]	10[3]

[1]CE Option: Cable shield (bare wire) is connected to internal Case
[2]CE Option: Pin G is connected to Case
Non CE Option: Pin G has No Connection
[3]CE Option: Pin 10 is connected to Case
Non CE Option: Pin has No Connection
[4]CE Option: Read Technical Bulletin "TB111" at www.encoder.com

CTi Automation - Phone: 800.894.0412 - Fax: 208.368.0415 - Web: www.ctiautomation.net - Email: info@ctiautomation.net

Model 755A NEMA Size 23 and 34

ENCODER PRODUCTS COMPANY

Features

- Standard NEMA Mounting
- Up to 30,000 Cycles Per Revolution
- High Temperature Option

The Model 755A NEMA Mount Accu-Coder™ with it's integral shaft coupling, mounts directly onto NEMA motors. It is designed for easy installation on industrial size 23 or 34 motor frames. It features standard bolt circle patterns, and can accommodate shaft sizes of 0.250", 0.375", or 6 mm. With its rugged all metal housing, and a wide range of CPR options, it will fit in many different applications, providing years of trouble free use.

Common Applications

Robotics, Assembly Machines, Motor-Mounted Feedback, Phototypesetters, Printers & Digital Plotters, Elevator Controls, Medical Diagnostic Equipment

Model 755A NEMA Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.

755A - 31 - S - 1000 - R - HV - 1 - 23A - S - CE

MODEL
755A Model 755A

SHAFT/BORE SIZE
31 Internal Shaft

OPERATING TEMPERATURE
L -40° to 70° C
S 0° to 70° C
H 0° to 100° C[1]

CYCLES PER REVOLUTION
1-30,000
See *CPR Options* below for available resolutions.
Price adder for CPR >1270

NUMBER OF CHANNELS
A Channel A
Q Quadrature A & B
R Quadrature A & B with Index Z[2]

OUTPUT TYPE
5 - 28V In/Out[3]
OC Open Collector
PU Pull-Up Resistor
PP Push-Pull
HV Line Driver
8 - 28V In/5V Out[4,8]
H5 Line Driver
P5 Push-Pull

FREQUENCY RESPONSE
1 Standard 100 kHz
2 200 kHz
5 250 kHz, >3000 CPR
3 500 kHz, >6000 CPR[5]
4 1 MHz, >10,000 CPR[5]

MOUNTING
23A NEMA 23 - 0.250" coupling
23B NEMA 23 - 0.375" coupling
23C NEMA 23 - 6 mm coupling
34A NEMA 34 - 0.250" coupling
34B NEMA 34 - 0.375" coupling
34C NEMA 34 - 6 mm coupling

CONNECTOR TYPE
S Standard 18" Cable[6]
C01 8-pin Molex
C02 Terminal Block
J00 18" Cable with 5-pin M12[9]
K00 18" Cable with 8-pin M12[9]

CERTIFICATION
N None
CE CE Marked[7]

For enhanced connectivity, available with an M12 in-line connector

For specification assistance call Customer Service at 1-800-894-0412

Model 755A NEMA CPR Options

0001*	0002*	0004*	0005*	0006*	0007*	0008*	0010*	0011*
0012*	0014*	0020	0021*	0024*	0025*	0028*	0030*	0032*
0033*	0034*	0035*	0038*	0040*	0042*	0045*	0050*	0060
0064*	0100	0120	0125	0128*	0144*	0150*	0160*	0200
0240*	0250	0254*	0256*	0300	0333*	0360	0400	0500
0512	0600	0625*	0635	0665*	0720	0768*	0800	0889
0900*	1000	1024	1200	1201*[a]	1203*[a]	1204*[a]	1250[a]	1270[a]
1440	1500	1800	2000	2048	2400[a]	2500	2540[a]	2880[a]
3000[a]	3600[a]	4000[a]	4096[a]	5000[a]	6000[a]	7200[a]	7500[a]	9000[a]
10,000[a]	10,240[a]	12,000[a]	12,500[a]	14,400[a]	15,000[a]	18,000[a]	20,000[a]	20,480[a]
25,000[a]	30,000[a]							

* Contact Customer Service for High Temperature Option.
[a] High Temperature Option (H) limited to 85° C maximum for these CPR options.

New CPR values are periodically added to those listed. Contact Customer Service to determine all currently available CPR values. Special disk resolutions are available upon request.
A one-time NRE fee may apply.

NOTES:
1 0° to 85° C for certain resolutions, see CPR Options.
2 Contact Customer Service for index gating options.
3 24 VDC max for high temperature option.
4 Standard temperature, 60 to 3000 CPR only.
5 Standard cable lengths only. For details, please refer to Technical Bulletin TB 116: *Noise and Signal Considerations*, at www.encoder.com.
6 For non-standard cable lengths, add a forward slash (/) plus cable length expressed in feet. Example: S/6 = 6 feet of cable.
7 Please refer to Technical Bulletin TB100: *When to Choose the CE Option.*
8 H5 and P5 outputs are not available with CE option.
9 5-pin not available with Line Driver (HV, H5) outputs. Additional cable lengths available. Please consult Customer Service.

Model 755A NEMA Size 23 and 34

Model 755A NEMA Specifications

Electrical

- Input Voltage: 4.75 to 28 VDC max for temperatures up to 70° C
  4.75 to 24 VDC for temperatures between 70° C to 100° C
- Input Current: 100 mA max with no output load
- Input Ripple: 100 mV peak-to-peak at 0-100 kHz
- Output Format: Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the encoder mounting face. See *Waveform Diagrams* below.
- Output Types: Open Collector- 100 mA max per channel
  Pull-Up- 100 mA max per channel
  Push-Pull- 20 mA max per channel
  Line Driver- 20 mA max per channel (Meets RS 422 at 5 VDC supply)
- Index: Occurs once per revolution. The index for units >3000 CPR is 90° gated to Outputs A and B. See *Waveform Diagrams* below.
- Freq Response: Up to 1 MHz.
- Noise Immunity: Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2
- Symmetry: 1 to 6000 CPR: 180° (±18°) electrical at 100 kHz output
  6001 to 20,480 CPR: 180° (±36°) electrical
- Quad Phasing: 1 to 6000 CPR: 90° (±22.5°) electrical at 100 kHz output
  6001 to 20,480 CPR: 90° (±36°)
- Min Edge Sep: 1 to 6000 CPR: 67.5° electrical at 100 kHz output
  6001 to 20,480 CPR: 54° electrical
  >20,480 CPR: 50° electrical
- Rise Time: Less than 1 microsecond
- Accuracy: Instrument and Quadrature Error : For 200 to 1999 CPR, 0.017° mechanical (1.0 arc minutes) from one cycle to any other cycle. For 2000 to 3000 CPR, 0.01° mechanical (0.6 arc minutes) from one cycle to any other cycle. Interpolation error (units > 3000 CPR only) within 0.005° mechanical. (Total Optical Encoder Error = Instrument + Quadrature + Interpolation)

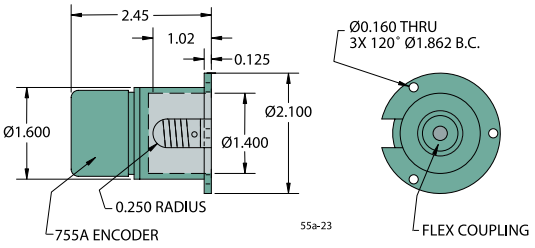
Mechanical

- Max Shaft Speed: 7500 RPM. Higher shaft speeds may be achievable, contact Customer Service.
- Coupling Bore: 0.250", 0.375", or 6 mm
- Starting Torque: 0.14 oz-in typical
  4.0 oz-in typical for -40° C operation
- Moment of Inertia: 2.8 x 10^{-4} oz-in-sec^2
- Max Acceleration: 1 x 10^5 rad/sec^2
- Electrical Conn: 18" cable (foil and braid shield, 24 AWG conductors), 5- or 8-pin M12 (12 mm) in-line connector with 18" cable (braid shield), 8-pin Molex, Terminal Block
- Housing: Black non-corrosive finish
- Bearings: Precision ABEC ball bearings
- Mounting: NEMA 23 and 34
- Weight: 4.50 oz typical on NEMA 23
  6.75 oz typical on NEMA 34

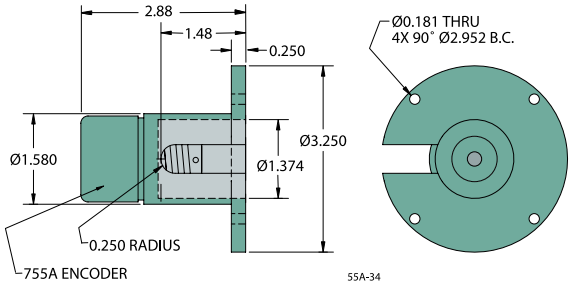
Environmental

- Operating Temp: 0° to 70° C for standard models
  -40° to 70° C for low temperature option
  0° to 100° C for high temperature option (0° to 85° C for certain resolutions, see CPR Options.)
- Storage Temp: -25° to +85° C
- Humidity: 98% RH non-condensing
- Vibration: 10 g @ 58 to 500 Hz
- Shock: 50 g @ 11 ms duration

Model 755A Size 23 NEMA Mount (23A, 23B, 23C)



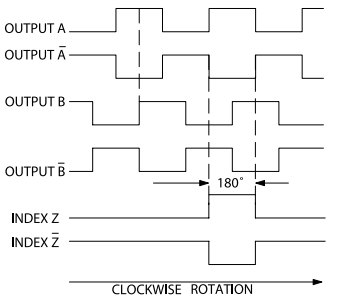
Model 755A Size 34 NEMA Mount (34A, 34B, 34C)



All dimensions are in inches with a tolerance of ±0.005" or ±0.01" unless otherwise specified

Waveform Diagrams

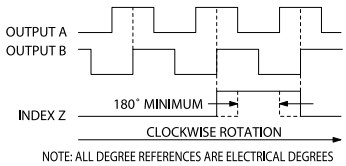
Line Driver and Push-Pull



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES

LDSIGC

Open Collector and Pull-Up



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES

SESIGC

NOTE: INDEX IS POSITIVE GOING

Wiring Table

Function	Cable Wire Color	Terminal Block	8-pin Molex	5-pin M12[2]	8-pin M12[2]
Com	Black	7	2	3	7
+VDC	White	8	1	1	2
A	Brown	1	8	4	1
A'	Yellow	2	7	-----	3
B	Red	3	4	2	4
B'	Green	4	3	-----	5
Z	Orange	6	6	5	6
Z'	Blue	5	5	-----	8
Shield	Bare[1]	-----	-----	-----	-----

[1]CE Option: Cable shield (bare wire) is connected to internal case
[2]CE Option: Read Technical Bulletin TB111

Model 702 Motor Mount

Features

- Up to 30,000 CPR
- IP66 Sealing Available
- Mounting Flange Available With Boss

The Model 702 Motor Mount Accu-Coder™ is a heavy duty, ultra- rugged, reliable, yet compact industry standard 2-inch diameter encoder. It is designed to withstand harsh factory and plant floor environments. The mounting flange with integral shaft and coupling, allows the 702 encoder to be easily installed on a motor or shaft assembly, without the need for additional brackets or couplings. With the ability to handle shaft speeds of up to 8000 RPM, and withstand the shock and vibration of high speed servo motors, you are sure to be pleased with the 702 Motor Mount Accu-Coder™.

Common Applications

Servo & Stepper Motor Control, Robotics, X-Y Positioning Tables, Machine Tools

Model 702 Motor Mount Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.

702	-	31	-	S	-	1000	-	R	-	HV	-	1	-	B	-	1	-	E	-	X	-	N	-	CE

MODEL
702 Size 20 (2.0")

COUPLING BORE
31 1/4", 0.250"
32 3/8", 0.375"
33 1/2", 0.500"

OPERATING TEMPERATURE
S 0° to 70° C
H 0° to 100°

CYCLES PER REVOLUTION
1-30,000
See *CPR Options* below for available resolutions.
Price adder for CPR >1270

NUMBER OF CHANNELS
A Channel A
Q Quadrature A & B
R Quadrature A & B with Index Z[2]

OUTPUT TYPE
5-28V In/Out[3]
OC Open Collector
PU Pull-Up Resistor
PP Push-Pull
HV Line Driver[8]
8-28V In/5V Out[4,10]
H5 Line Driver[8]
P5 Push-Pull

FREQUENCY RESPONSE
1 100 kHz (Standard)
2 200 kHz
5 250 kHz, >3000 CPR
3 500 kHz, >6000 CPR[5]
4 1 MHz, >10,000 CPR[5]

MOUNTING
I Integral Shaft Coupling
B Integral Coupling w/Boss

SEAL
N No Seal
1 IP66
2 IP64

CONNECTOR LOCATION
E End
S Side

CONNECTOR TYPE[9]
W 6-pin MS Style
Y 7-pin MS Style
X 10-pin MS Style
9D 9-pin D-subminiature
J 5-pin M12 (12 mm)
K 8-pin M12 (12 mm)
G Gland, 24" Cable[6]

MATING CONNECTOR
N No
Y Yes

CERTIFICATION
N None
CE CE Marked[7]

For specification assistance call Customer Service at 1-800-894-0412

Model 702 Motor Mount CPR Options

0001*	0002*	0004*	0005*	0006*	0007*	0008*	0010*	0011*
0012*	0014*	0020	0021*	0024*	0025*	0028*	0030*	0032*
0033*	0034*	0035*	0038*	0040*	0042*	0045*	0050*	0060
0064*	0100	0120	0125	0128*	0144*	0150*	0160*	0200
0240*	0250	0254*	0256*	0300	0333*	0360	0400	0500
0512	0600	0625*	0635	0665*	0720	0768*	0800	0889
0900*	1000	1024	1200	1201*[a]	1203*[a]	1204*[a]	1250[a]	1270[a]
1440	1500	1800	2000	2048	2400[a]	2500	2540[a]	2880[a]
3000[a]	3600[a]	4000[a]	4096[a]	5000[a]	6000[a]	7200[a]	7500[a]	9000[a]
10,000[a]	10,240[a]	12,000[a]	12,500[a]	14,400[a]	15,000[a]	18,000[a]	20,000[a]	20,480[a]
25,000[a]	30,000[a]							

* Contact Customer Service for High Temperature Option.
[a] High Temperature Option (H) limited to 85° C maximum for these CPR options.

New CPR values are periodically added to those listed. Contact Customer Service to determine all currently available CPR values. Special disk resolutions are available upon request.
A one-time NRE fee may apply.

NOTES:
1 0° to 85° C for certain resolutions, see CPR Options.
2 Contact Customer Service for non-standard index gating options.
3 24 VDC max for high temperature option.
4 Standard temperature, 60 to 3000 CPR only.
5 Standard cable lengths only. For details, please refer to Technical Bulletin TB 116: *Noise and Signal Considerations* on the web at www.encoder.com.
6 For non-standard cable lengths, add a forward slash (/) plus cable length expressed in feet. Example: G/6 = 6 feet of cable.
7 Please refer to Technical Bulletin TB100: *When to Choose the CE Option* at www.encoder.com.
8 Not available with 5-pin M12 or 6-pin MS Type connector. Available with 7-pin MS Type connector only without Index Z.
9 For Mating Connectors, Cables, and Cordsets see Electrical Accessories at www.encoder.com.
10 H5 and P5 outputs are not available with CE option.

Model 702 Motor Mount

Model 702 Motor Mount Specifications

Electrical

Input Voltage	4.75 to 28 VDC max for temperatures up to 70° C 4.75 to 24 VDC for temperatures between 70° C to 100° C
Input Current	100 mA max with no output load
Input Ripple	100 mV peak-to-peak at 0 to 100 kHz
Output Format	Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the encoder mounting face. See *Waveform Diagrams* below.
Output Types	Open Collector- 100 mA max per channel Pull-Up- 100 mA max per channel Push-Pull- 20 mA max per channel Line Driver- 20 mA max per channel (Meets RS 422 at 5 VDC supply)
Index	Occurs once per revolution. The index for units >3000 CPR is 90° gated to Outputs A and B. See *Waveform Diagrams* below.
Freq Response	Up to 1 MHz.
Noise Immunity	Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2
Symmetry	1 to 6000 CPR: 180° (±18°) electrical at 100 kHz output 6001 to 20,480 CPR: 180° (±36°) electrical
Quad Phasing	1 to 6000 CPR: 90° (±22.5°) electrical at 100 kHz output 6001 to 20,480 CPR: 90° (±36°) electrical
Min Edge Sep	1 to 6000 CPR: 67.5° electrical at 100 kHz output 6001 to 20,480 CPR: 54° electrical >20,480 CPR: 50° electrical
Rise Time	Less than 1 microsecond
Accuracy	Instrument and Quadrature Error: For 200 to 1999 CPR, 0.017° mechanical (1.0 arc minutes) from one cycle to any other cycle. For 2000 to 3000 CPR, 0.01° mechanical (0.6 arc minutes) from one cycle to any other cycle. Interpolation error (units > 3000 CPR only) within 0.005° mechanical. (Total Optical Encoder Error = Instrument + Quadrature + Interpolation)

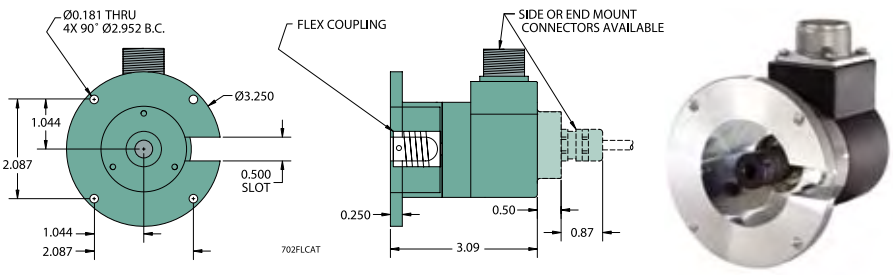
Mechanical

Max Shaft Speed	8000 RPM. Higher shaft speeds may be achievable, contact Customer Service.
Coupling Size	0.250", 0.375", or 0.500"
Starting Torque	1.0 oz-in typical with IP64 seal or no seal 3.0 oz-in typical with IP66 shaft seal
Moment of Inertia	5.2×10^{-4} oz-in-sec^2
Max Acceleration	1×10^5 rad/sec^2
Connector Type	6-, 7-, and 10-pin MS Style, 5- or 8-pin M12 (12 mm), 9-pin D-subminiature, or gland with 24 inches of cable (foil and braid shield, 24 AWG conductors)
Housing	Black non-corrosive finish
Bearings	Precision ABEC ball bearings
Weight	14 oz typical

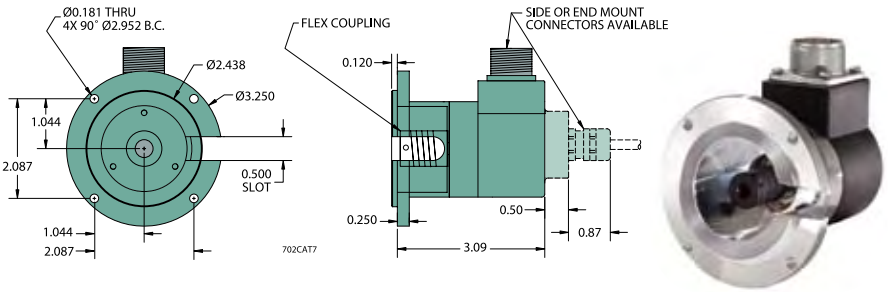
Environmental

Operating Temp	0° to 70° C for standard models 0° to 100° C for high temperature option (0° to 85° C for certain resolutions, see CPR Options.)
Storage Temp	-25° to +85° C
Humidity	98% RH non-condensing
Vibration	20 g @ 58 to 500 Hz
Shock	75 g @ 11 ms duration
Sealing	IP66 (NEMA 13 and 4/4X) with shaft seal; IP64 available

Model 702 With Integral Coupling (I)



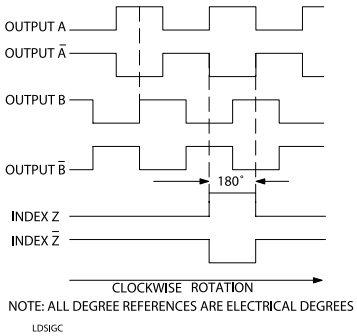
Model 702 With Integral Coupling And Boss (B)



All dimensions are in inches with a tolerance of ±0.005" or ±0.01" unless otherwise specified

Waveform Diagrams

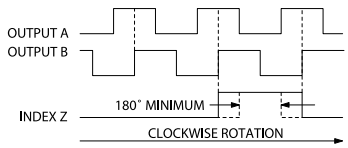
Line Driver and Push-Pull



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES

LDSIGC

Open Collector and Pull-Up



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES

NOTE: INDEX IS POSITIVE GOING

SESIGC

Wiring Table

Function	Gland Cable Wire Color	5-pin M12[2]	8-pin M12[2]	10-pin MS	7-pin MS HV,H5	7-pin MS PU, PP OC, P5	6-pin MS PU, PP OC, P5	9-pin D-sub
Com	Black	3	7	F	F	F	A, F	9
+VDC	Red	1	2	D	D	D	B	1
A	White	4	1	A	A	A	D	2
A'	Brown	----	3	H	C	----	----	3
B	Blue	2	4	B	B	B	E	4
B'	Violet	----	5	I	E	----	----	5
Z	Orange	5	6	C	----	C	C	6
Z'	Yellow	----	8	J	----	----	----	7
Case	Green	----	----	G	G	G	----	8
Shield	Bare[1]	----	----	----	----	----	----	----

[1]CE Option: Cable shield (bare wire) is connected to internal case
[2]CE Option: Read Technical Bulletin TB111

Ordering/Delivery/ Technical Support

Ordering Through a Distributor
Encoder Products Company has distributors across the United States and Canada. Call 800-894-0412 and ask a Customer Service Representative for a distributor in your area.

Part Numbers
Accu-Coder™ part numbers are found on the model Datasheet located at www.encoder.com. Use the appropriate *Ordering Guide* for your particular model. It is important to specify the complete part number. If you are reordering, the serial number of the unit being replaced will help speed the ordering process. Ordering with incomplete information may delay product delivery. In addition, Encoder Products Company cannot assume responsibility for errors when a part number is incomplete. If you need help creating a part number, contact Customer Service.

Product Lead Time
Standard lead time is 4 to 6 business days. Expedite Service is available upon request. Accessories are generally in stock and available for quick delivery. Contact Customer Service to confirm lead times.

Next Day Express
Single-piece orders for many of our products can ship the next business day without an expedite charge. Contact Customer Service for details.

Expedite Service
One, two, and three working day expedited service is available upon request. Contact Customer Service for applicable expedite charges. Expedited service is done on a “best efforts” basis. In some cases a part shortage or other unforeseen factor may cause an expedited order to ship late. In such a case, the expedite charge is prorated.

Confirming an Order
Confirmation by mail or fax is required for all telephone orders. Please be sure the order is clearly marked “confirmation”. Please check your purchase order against the acknowledgment that Encoder Products Company faxes to you. To ensure accuracy, a Customer Service Representative will check your confirmation against your order.

Change Orders
To change an order, ask for a Customer Service Representative. For faster service, either have your purchase order number or Encoder Products Company’s sales order number available. Service charges are assessed for some changes, including order cancellations. Contact Customer Service to determine applicable charges.

Shipping Methods
Orders will be shipped out by UPS or Federal Express. All shipments are F.O.B. factory.

Consignment & Evaluation Units
If you are a new OEM account or have a new OEM application, consignment or evaluation units may be available for up to 60 days Contact Customer Service for complete details.

Technical Application Support
Our Technical Support professionals are available to assist you in your application needs - whether its selecting the right encoder for your application, troubleshooting a new installation, or connecting your new encoder to your motion control system.

Custom Design Service
If your application calls for a solution that cannot be solved using off-the-shelf-products, EPC's Custom Design Service may be just what you need. A simple phone call to Customer Service will put our expertise to work for you.

Expert Cross Reference & Retrofit Service
Encoder Products Company understands the importance of time when you have a machine down. Through its free Cross Reference and Retrofit Service, and thanks to a thorough library of specifications and dimensional information for a wide range of competitive encoders, EPC offers expert assistance for the cross-referencing and/or retrofit replacement of most domestic and foreign optical rotary encoders. In addition, serviceable replacements can often be found for encoders that use other technologies. As a final service, for those hard to find units, EPC can often suggest an alternative approach that will get you back up and running. We have provided an Expert Cross-Reference Service page on our website. It provides you with part numbers of competitors encoders, and compares them with Accu-Coder™ encoders, so that you can begin the cross-referencing process.

Direct Replacements
Encoder Products has identified some of the encoders on the market that are currently hard to find or replace. We have labeled these “Direct Replacement Encoders” and have made a selection available at www.encoder.com.

Warranty/Returns/Repairs

Warranty Policy

Products manufactured by Encoder Products Co., Inc. (EPC International, Inc.), are warranted against defects in materials and workmanship, and are warranted to meet the performance specifications as listed in the current catalog and/or data sheet for the specific product being warranted. This warranty applies to all standard catalog product configurations, with the exception of units with a rated operating temperature exceeding 70° C, for three (3) years following the date of shipment. For units with a rated operating temperature exceeding 70° C the warranty period shall be two (2) years following the date of shipment. During that period, EPC will, at its sole option, repair or replace, at no cost to the customer, products which prove to be defective, provided the defect or failure is not due to misuse or abuse of the product. Any unauthorized attempt to repair the product(s) by the customer, or any unauthorized modifications by the customer, can, at EPC's sole option, cause this warranty to become null and void. In addition, this warranty does not apply to products that have been subjected to abuse or operated in environments that exceed their design specifications. The customer is responsible for shipment of the defective product to the EPC factory. Software products are supplied on a site license basis subject to the same performance warranty provisions; the materials and workmanship provision applies to the distribution media only. NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION IS EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO WARRANTY FOR MERCHANTABILITY OR FOR FITNESS OF PURPOSE. EPC SHALL, IN NO CASE, BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL, OR SPECIAL DAMAGES OF ANY KIND OR NATURE WHATSOEVER. NOTWITHSTANDING, IN ANY CASE, EPC'S LIABILITY SHALL BE LIMITED TO REPAIR, REPLACEMENT, OR PURCHASE PRICE REFUND, AT ITS SOLE OPTION, ONLY AFTER THE RETURN OF SUCH GOODS WITH CONSENT IN ACCORDANCE WITH THE RETURN POLICY AND WITH SHIPPING CHARGES PREPAID. ANY WARRANTY SERVICE (CONSISTING OF TIME, TRAVEL, AND EXPENSES RELATED TO SUCH SERVICES) PERFORMED OTHER THAN AT ENCODER PRODUCTS COMPANY'S FACTORY, SHALL BE AT CUSTOMERS EXPENSE.

Return Policy

Only products currently stocked by Encoder Products Company may be returned for restocking. Products which have been manufactured or configured to customer specifications are not stocked and may not be returned. Returned products are subject to a restocking fee of $25 or 25% of the purchase price, whichever is greater, and must be returned within 30 days of the date shipped from Encoder Products Company.

All products being returned must be 100% complete and must be packaged in ORIGINAL PACKAGING. All packaging materials, manuals, other accessories and documentation must be included in the original packaging. Items sent for return consideration will be denied and Encoder Products Company's return policy will not be honored, in the event that a return shipment is received by us improperly packaged, altered, or physically damaged. All items will be inspected and tested upon receipt.

A Return Materials Authorization (RMA) number is required for any item returned for credit. Returns should be sent to our Repair Department. RMA numbers may be obtained by contacting Customer Service in advance. RMA numbers will be issued to original purchaser only.

Repair Services

Each Accu-Coder™ manufactured by Encoder Products Company is backed by our best-in-the-industry three year warranty. If you experience a problem, call our trained professionals. We can often troubleshoot a problem over the phone and determine if a repair is needed. If its necessary to return the encoder for repair, our technicians will perform a complete evaluation and recommend a course of action. In an emergency situation our technicians can often have your evaluation and repair completed, and ready for return shipment, within a matter of hours after receiving your encoder.